

**APÉNDICE DE
LABORATORIO 1**

**APÉNDICE DE
LABORATORIO 2**

**APÉNDICE DE
LABORATORIO 3**

**APÉNDICE DE
LABORATORIO 4**

APÉNDICE DE LABORATORIO 1

Informe de Laboratorio del muestreo

Realizado en Julio de 2015

(A) Análisis por Fluorescencia de Rayos X, Método EPA 6200

- 224 muestras de suelo y sedimento en nueve transectos en el arroyo Tinajas
- 228 muestra de suelo y sedimento en ocho transectos en el Río Bacanuchi
- 224 muestras de suelo y sedimento en nueve transectos en el Río Sonora
- 129 muestras de suelo y sedimento en catorce transectos en los arroyos tributarios a la Presa el Molinito
- 90 muestras de suelo y sedimento para determinar valores de fondo en la cuenca del río Sonora
- 169 muestras de suelo y sedimento para determinar valores de fondo en la cuenca de río San Miguel



INFORME DE RESULTADOS
TINAJAS

Datos del solicitante:

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Información de las muestras

Fecha de recepción de muestras: 13 de julio del 2015

Se recibieron 224 muestras de suelos preservadas e identificadas adecuadamente, en bolsas de plástico, etiquetadas como T1 A LA T9 con diferentes profundidades y claves adjunta A, LB, LC, LE ,RB, RD, RC y RE para cada una.

Información de los análisis

En el laboratorio de Geoquímica Ambiental las muestras fueron homogeneizadas y tamizadas por malla N° 10 para su análisis de pH, Conductividad eléctrica y FRX.

El pH se determinó con un potenciómetro Hanna Instruments, HI-98185 y se siguió el método estandarizado 9040 C de la US-EPA .

Conductividad eléctrica (CE) determinó con un conductímetro OAKTON Con 700. y se siguió el método APHA 1992. Standard methods for the examination of water and wastewater.

Fluorescencia de rayos X. El análisis se determinó con un equipo de Fluorescencia de Rayos X, NITTON FXL 950 de Thermo Scientific y se siguió el método EPA 6200. La determinación fue realizada por triplicado con un tiempo de medición de 90s en el modo de suelo y 31 s en el modo de mina para Fe. Los elementos cuantificados en cada determinación se reportan en mg/kg (ppm) para el modo de suelo y (%) para el modo de mina.



Listado de recepción de muestras:

ID Campo	coordenadas		ID Campo	coordenadas	
	X	Y		X	Y
T1.1-A (0-5cm)	563545	3417793	T2-RB (150cm)	564023	3414463
T1.1-A (5-30cm)	563545	3417793	T2-RB (200cm)	564023	3414463
T1.1-A (30-40cm)	563545	3417793	T2-RB (230cm)	564023	3414463
T1.1-A (40-100cm)	563545	3417793	T3-A (0-5cm)	563743	3412880
T1.1-A (>100cm)	563545	3417793	T3-A (25cm)	563743	3412880
T1.1-LB (0-5cm)	563550	3417795	T3-A (50cm)	563743	3412880
T1.1-LB (5-30cm)	563550	3417795	T3-A (100cm)	563743	3412880
T1.1-LB (30-60cm)	563550	3417795	T3-A (150cm)	563743	3412880
T1.1-LB (60-90cm)	563550	3417795	T3-A (200cm)	563743	3412880
T1.1-LB (90-120cm)	563550	3417795	T3-A (250cm)	563743	3412880
T1.1-LB (+120cm)	563550	3417795	T3-LB (0-5cm)	563741	3412879
T1.1-RB (0-5cm)	563549	3417793	T3-LB (25cm)	563741	3412879
T1.1-RB (5-25cm)	563549	3417793	T3-LB (50cm)	563741	3412879
T1.1-RB (25-50cm)	563549	3417793	T3-LB (100cm)	563741	3412879
T1.1-RB (50-100cm)	563549	3417793	T3-LB (150cm)	563741	3412879
T1.1-RB (>100cm)	563549	3417793	T3-LB (200cm)	563741	3412879
T2-A (0-5cm)	564012	3414465	T3-LB (250cm)	563741	3412879
T2-A (25cm)	564012	3414465	T3-LC (0-5cm)	563730	3412871
T2-A (50cm)	564012	3414465	T3-LC (25cm)	563730	3412871
T2-A (100cm)	564012	3414465	T3-LC (50cm)	563730	3412871
T2-A (150cm)	564012	3414465	T3-LC (100cm)	563730	3412871
T2-A (200cm)	564012	3414465	T3-LD (0-5cm)	563724	3412857
T2-A (240cm)	564012	3414465	T3-LD (25cm)	563724	3412857
T2-LB (0-5cm)	564004	3414471	T3-LD (50cm)	563724	3412857
T2-LB (25cm)	564004	3414471	T3-LD (100cm)	563724	3412857
T2-LB (50cm)	564004	3414471	T3-LE (0-5cm)	563717	3412844
T2-LB (100cm)	564004	3414471	T3-LE (25cm)	563717	3412844
T2-LB (150cm)	564004	3414471	T3-LE (50cm)	563717	3412844
T2-LB (200cm)	564004	3414471	T3-LE (100cm)	563717	3412844
T2-LB (240cm)	564004	3414471	T3-RB (5cm)	563745	3412881
T2-RB (0-5cm)	564023	3414463	T3-RB (25cm)	563745	3412881
T2-RB (25cm)	564023	3414463	T3-RB (50cm)	563745	3412881
T2-RB (50cm)	564023	3414463	T3-RB (100cm)	563745	3412881
T2-RB (100cm)	564023	3414463	T3-RB (150cm)	563745	3412881



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Universidad Nacional Autónoma de México
Geoquímica Ambiental**



ID Campo	coordenadas		ID Campo	coordenadas	
	X	Y		X	Y
T3-RC (0-5cm)	563752	3412895	T5-A (250cm)	563769	3409395
T3-RC (25cm)	563752	3412895	T5-LB (0-5cm)	563766	3409395
T3-RC (50cm)	563752	3412895	T5-LB (25cm)	563766	3409395
T3-RC (100cm)	563752	3412895	T5-LB (50cm)	563766	3409395
T3-RD (5cm)	563771	3412909	T5-LB (100cm)	563766	3409395
T3-RD (25cm)	563771	3412909	T5-LB (150cm)	563766	3409395
T3-RD (50cm)	563771	3412909	T5-LB (200cm)	563766	3409395
T3-RD (100cm)	563771	3412909	T5-LC (0-5cm)	563762	3409395
T4-A (0-5cm)	563688	3411506	T5-LC (25cm)	563762	3409395
T4-A (25cm)	563688	3411506	T5-LC (50cm)	563762	3409395
T4-A (50cm)	563688	3411506	T5-LD (0-5cm)	563746	3409395
T4-A (100cm)	563688	3411506	T5-LD (25cm)	563746	3409395
T4-A (150cm)	563688	3411506	T5-LD (50cm)	563746	3409395
T4-A (200cm)	563688	3411506	T5-LE (0-5cm)	563722	3409385
T4-A (250cm)	563688	3411506	T5-LE (25cm)	563722	3409385
T4-LB (0-5cm)	563680	3411529	T5-LE (50cm)	563722	3409385
T4-LB (25cm)	563680	3411529	T5-RB (0-5cm)	563774	3409394
T4-LB (50cm)	563680	3411529	T5-RB (25cm)	563774	3409394
T4-LB (50-100cm)	563680	3411529	T5-RB (50cm)	563774	3409394
T4-LB (100-150cm)	563680	3411529	T5-RB (100cm)	563774	3409394
T4-LB (150-200cm)	563680	3411529	T5-RB (150cm)	563774	3409394
T4-LB (200-300cm)	563680	3411529	T5-RB (200cm)	563774	3409394
T4-LB (340cm)	563680	3411529	T5-RC (0-5cm)	563775	3409394
T4-RB (0-5cm)	563689	3411506	T5-RC (25cm)	563775	3409394
T4-RB (10-30cm)	563689	3411506	T5-RC (50cm)	563775	3409394
T4-RB (50cm)	563689	3411506	T5-RD (0-5cm)	563790	3409411
T4-RB (100cm)	563689	3411506	T5-RD (25cm)	563790	3409411
T4-RB (150cm)	563689	3411506	T5-RD (50cm)	563790	3409411
T4-RB (200cm)	563689	3411506	T5-RE (0-5cm)	563820	3409421
T4-RB (250-270cm)	563689	3411506	T5-RE (25cm)	563820	3409421
T5-A (0-5cm)	563769	3409395	T5-RE (50cm)	563820	3409421
T5-A (25cm)	563769	3409395	T6-A (0-5cm)	563818	3408470
T5-A (50cm)	563769	3409395	T6-A (25cm)	563818	3408470
T5-A (100cm)	563769	3409395	T6-A (50cm)	563818	3408470
T5-A (150cm)	563769	3409395	T6-A (100cm)	563818	3408470
T5-A (200cm)	563769	3409395	T6-A (150cm)	563818	3408470



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Geoquímica Ambiental



ID Campo	coordenadas		ID Campo	coordenadas	
	X	Y		X	Y
T6-A (200cm)	563818	3408470	T7-RB (50cm)	563500	3407360
T6-LB (0-5cm)	563812	3408470	T7-RB (100cm)	563500	3407360
T6-LB (25cm)	563812	3408470	T7-RB (150cm)	563500	3407360
T6-LB (50cm)	563812	3408470	T7-RB (200cm)	563500	3407360
T6-LB (100cm)	563812	3408470	T7-RC (0-5cm)	563504	3407337
T6-LB (150cm)	563812	3408470	T7-RC (25cm)	563504	3407337
T6-LB (200cm)	563812	3408470	T7-RC (50cm)	563504	3407337
T6-LB (250cm)	563812	3408470	T7-RD (0-5cm)	563522	3407339
T6-RB (5cm)	563820	3408479	T7-RD (25cm)	563522	3407339
T6-RB (25cm)	563820	3408479	T7-RD (50cm)	563522	3407339
T6-RB (50cm)	563820	3408479	T7-RE (0-5cm)	563548	3407349
T6-RB (100cm)	563820	3408479	T7-RE (25cm)	563548	3407349
T6-RB (150cm)	563820	3408479	T7-RE (50cm)	563548	3407349
T6-RB (200cm)	563820	3408479	T8-A(0-5cm)	563683	3405740
T7-A (0-5cm)	563492	3407362	T8-A(25cm)	563683	3405740
T7-A (25cm)	563492	3407362	T8-A(50cm)	563683	3405740
T7-A (50cm)	563492	3407362	T8-A(100-120cm)	563683	3405740
T7-A (100cm)	563492	3407362	T8-LB(0-5cm)	563679	3405740
T7-A(150cm)	563492	3407362	T8-LB(25cm)	563679	3405740
T7-A (200cm)	563492	3407362	T8-LB(50cm)	563679	3405740
T7-A (250cm)	563492	3407362	T8-LB(80cm)	563679	3405740
T7-LB (0-5cm)	563489	3407362	T8-LC(0-5cm)	563684	3405760
T7-LB (25cm)	563489	3407362	T8-LC(90cm)	563684	3405760
T7-LB (50cm)	563489	3407362	T8-RB(0-5cm)	563691	3405738
T7-LB (100cm)	563489	3407362	T8-RB(25cm)	563691	3405738
T7-LB (150cm)	563489	3407362	T8-RB(50cm)	563691	3405738
T7-LB (200cm)	563489	3407362	T8-RB(100cm)	563691	3405738
T7-LC (0-5cm)	563475	3407359	T9-A (0-5cm)	563829	3403176
T7-LC (25cm)	563475	3407359	T9-A (5-25cm)	563829	3403176
T7-LC (50cm)	563475	3407359	T9-A (25-50cm)	563829	3403176
T7-LD (0-5cm)	563467	3407356	T9-A (50-100cm)	563829	3403176
T7-LD (25cm)	563467	3407356	T9-A (100-150cm)	563829	3403176
T7-LD (50cm)	563467	3407356	T9-A (150-170cm)	563829	3403176
T7-RB (0-5cm)	563500	3407360	T9-A (170-200cm)	563829	3403176
T7-RB (25cm)	563500	3407360	T9-A (+200cm)	563829	3403176



ID Campo	coordenadas		ID Campo	coordenadas	
	X	Y		X	Y
T9-LB (0-5cm)	563819	3403163	T9-RB (0-5cm)	563840	3403173
T9-LB (5-25cm)	563819	3403163	T9-RB (5-25cm)	563840	3403173
T9-LB (+200cm)	563819	3403163	T9-RB (25-50cm)	563840	3403173
T9-LB (25-50cm)	563819	3403163	T9-RB (50-100cm)	563840	3403173
T9-LB (50-100cm)	563819	3403163	T9-RB (100-150cm)	563840	3403173
T9-LB (100-150cm)	563819	3403163	T9-RB (150-200cm)	563840	3403173
T9-LB (150-200cm)	563819	3403163	T9-RB (+200cm)	563840	3403173

Resultados de pH y CE:

ID Campo	pH	CE (µS/cm)	ID Campo	pH	CE (µS/cm)
T1.1-A (0-5cm)	6.89	118.3	T2-A (100cm)	3.72	509
T1.1-A (5-30cm)	5.42	70	T2-A (150cm)	3.81	1014
T1.1-A (30-40cm)	4.31	92.5	T2-A (200cm)	3.86	828
T1.1-A (40-100cm)	3.93	112.2	T2-A (240cm)	3.85	904
T1.1-A (>100cm)	3.87	79.95	T2-LB (0-5cm)	5.6	94.3
T1.1-LB (0-5cm)	4.8	49.7	T2-LB (25cm)	4.13	86.2
T1.1-LB (5-30cm)	4.89	60.3	T2-LB (50cm)	4	144
T1.1-LB (30-60cm)	5.06	77.2	T2-LB (100cm)	4.03	123.8
T1.1-LB (60-90cm)	6.85	87.1	T2-LB (150cm)	3.48	873
T1.1-LB (90-120cm)	7.05	188.7	T2-LB (200cm)	4.11	605
T1.1-LB (+120cm)	7.28	96.8	T2-LB (240cm)	4.1	678
T1.1-RB (0-5cm)	4.4	280	T2-RB (0-5cm)	5.66	45.4
T1.1-RB (5-25cm)	5.05	99	T2-RB (25cm)	4.63	44.2
T1.1-RB (25-50cm)	4.23	138.5	T2-RB (50cm)	3.89	212
T1.1-RB (50-100cm)	4.27	110.1	T2-RB (100cm)	3.8	236.5
T1.1-RB (>100cm)	4.08	92.4	T2-RB (150cm)	3.66	246
T2-A (0-5cm)	4.52	42.7	T2-RB (200cm)	3.63	879
T2-A (25cm)	3.88	78.3	T2-RB (230cm)	3.68	983
T2-A (50cm)	3.79	1067	T3-A (0-5cm)	5.88	30.9



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Universidad Nacional Autónoma de México
Geoquímica Ambiental



ID Campo	pH	CE ($\mu\text{S/cm}$)	ID Campo	pH	CE ($\mu\text{S/cm}$)
T3-A (25cm)	5.8	37.3	T3-RD (5cm)	7.76	35.3
T3-A (50cm)	4.38	57.4	T3-RD (25cm)	7.86	26.3
T3-A (100cm)	4.33	69.4	T3-RD (50cm)	7.95	71.8
T3-A (150cm)	4.39	82.2	T3-RD (100cm)	7.6	211
T3-A (200cm)	3.91	705	T4-A (0-5cm)	7.3	110.4
T3-A (250cm)	5.09	265	T4-A (25cm)	5.34	153.9
T3-LB (0-5cm)	5.99	46.2	T4-A (50cm)	3.91	182.4
T3-LB (25cm)	5.2	64.4	T4-A (100cm)	3.53	1225
T3-LB (50cm)	4.32	135.5	T4-A (150cm)	3.5	1560
T3-LB (100cm)	4.09	561	T4-A (200cm)	3.85	1137
T3-LB (150cm)	4.32	446	T4-A (250cm)	7.04	364
T3-LB (200cm)	6.16	149.6	T4-LB (0-5cm)	7.97	58.6
T3-LB (250cm)	7.54	187.8	T4-LB (25cm)	6.35	50.1
T3-LC (0-5cm)	7.62	58	T4-LB (50cm)	3.92	475
T3-LC (25cm)	7.98	20.9	T4-LB (50-100cm)	3.68	1502
T3-LC (50cm)	8.39	26.5	T4-LB (100-150cm)	3.93	1396
T3-LC (100cm)	7.82	19.81	T4-LB (150-200cm)	6.8	427
T3-LD (0-5cm)	8.05	29.4	T4-LB (200-300cm)	7.14	179.5
T3-LD (25cm)	7.97	52.2	T4-LB (340cm)	7.53	146.6
T3-LD (50cm)	7.46	20	T4-RB (0-5cm)	7.3	122.2
T3-LD (100cm)	7.94	18.7	T4-RB (10-30cm)	4.27	697
T3-LE (0-5cm)	7.52	99.5	T4-RB (50cm)	7.61	54.1
T3-LE (25cm)	8.24	23.3	T4-RB (100cm)	7.89	46
T3-LE (50cm)	8.75	30.9	T4-RB (150cm)	8.32	85.1
T3-LE (100cm)	8.55	22	T4-RB (200cm)	7.04	67.6
T3-RB (5cm)	5.71	31.4	T4-RB (250-270cm)	7.32	81.6
T3-RB (25cm)	4.19	60.1	T5-A (0-5cm)	6.97	25.7
T3-RB (50cm)	4.22	53.8	T5-A (25cm)	4.06	479
T3-RB (100cm)	3.93	169.5	T5-A (50cm)	5.67	54.5
T3-RB (150cm)	3.65	795	T5-A (100cm)	3.73	1051
T3-RC (0-5cm)	6.8	59.6	T5-A (150cm)	3.83	722
T3-RC (25cm)	7.9	38.9	T5-A (200cm)	3.88	687
T3-RC (50cm)	8.65	28.7	T5-A (250cm)	3.99	994
T3-RC (100cm)	7.76	16.15	T5-LB (0-5cm)	7.34	30.4



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Universidad Nacional Autónoma de México
Geoquímica Ambiental



ID Campo	pH	CE ($\mu\text{S/cm}$)	ID Campo	pH	CE ($\mu\text{S/cm}$)
T5-LB (25cm)	6.02	342	T6-A (100cm)	4.7	904
T5-LB (50cm)	4.32	828	T6-A (150cm)	6.61	277
T5-LB (100cm)	3.77	496	T6-A (200cm)	7.29	154.2
T5-LB (150cm)	4.02	894	T6-LB (0-5cm)	8.3	46.2
T5-LB (200cm)	6.56	239	T6-LB (25cm)	8.16	44.8
T5-LC (0-5cm)	6.78	207	T6-LB (50cm)	8.16	30.4
T5-LC (25cm)	7.52	243	T6-LB (100cm)	8.45	49.1
T5-LC (50cm)	7.68	185.7	T6-LB (150cm)	8.94	30.3
T5-LD (0-5cm)	7.24	40.1	T6-LB (200cm)	8.39	34.3
T5-LD (25cm)	6.97	108.9	T6-LB (250cm)	8.38	36.57
T5-LD (50cm)	7.28	69.9	T6-RB (5cm)	8	28.9
T5-LE (0-5cm)	7.48	27.4	T6-RB (25cm)	4.97	101.2
T5-LE (25cm)	7.23	56.1	T6-RB (50cm)	4.05	688
T5-LE (50cm)	7.29	50.7	T6-RB (100cm)	3.93	809
T5-RB (0-5cm)	4.5	111.6	T6-RB (150cm)	7.58	395
T5-RB (25cm)	5.83	65.1	T6-RB (200cm)	8.35	215
T5-RB (50cm)	4.05	603	T7-A (0-5cm)	8.13	44.1
T5-RB (100cm)	5.85	289.5	T7-A (25cm)	7.82	33.1
T5-RB (150cm)	6.57	101.8	T7-A (50cm)	7.44	29.1
T5-RB (200cm)	6.51	310	T7-A (100cm)	7.06	34.7
T5-RC (0-5cm)	7.72	75.1	T7-A (150cm)	6.28	35.9
T5-RC (25cm)	7.61	32.7	T7-A (200cm)	5.68	117.4
T5-RC (50cm)	7.4	29.5	T7-A (250cm)	6.22	272
T5-RD (0-5cm)	6.87	78.5	T7-LB (0-5cm)	5.63	85.4
T5-RD (25cm)	8.05	75.3	T7-LB (25cm)	6.66	205
T5-RD (50cm)	7.4	175.6	T7-LB (50cm)	6.92	360
T5-RE (0-5cm)	6.43	1338.2	T7-LB (100cm)	7.03	207
T5-RE (25cm)	6.53	269	T7-LB (150cm)	7.38	267
T5-RE (50cm)	6.625	259.5	T7-LB (200cm)	7.32	329
T6-A (0-5cm)	7.14	29	T7-LC (0-5cm)	8.16	51.8
T6-A (25cm)	3.78	1220	T7-LC (25cm)	7.77	30.5
T6-A (50cm)	4.55	160.1	T7-LC (50cm)	7.9	50.8



ID Campo	pH	CE (µS/cm)	ID Campo	pH	CE (µS/cm)
T7-LD (0-5cm)	7.45	88.6	T8-LC(90cm)	8.15	60.3
T7-LD (25cm)	7.48	201	T8-RB(0-5cm)	6.67	59.9
T7-LD (50cm)	7.94	36.6	T8-RB(25cm)	5.45	23.6
T7-RB (0-5cm)	7.69	34.8	T8-RB(50cm)	6.76	31.2
T7-RB (25cm)	7.46	33.1	T8-RB(100cm)	7	35
T7-RB (50cm)	7.3	39.7	T9-A (0-5cm)	8.18	95
T7-RB (100cm)	7.72	210	T9-A (5-25cm)	7.29	53
T7-RB (150cm)	7.77	330	T9-A (25-50cm)	7.3	37
T7-RB (200cm)	8.21	205	T9-A (50-100cm)	7.37	31.7
T7-RC (0-5cm)	8.16	51.8	T9-A (100-150cm)	7.54	588
T7-RC (25cm)	8.58	58.5	T9-A (150-170cm)	7.05	120.8
T7-RC (50cm)	8.4	63.9	T9-A (170-200cm)	7.87	59.3
T7-RD (0-5cm)	7.99	59.9	T9-A (+200cm)	7.54	96
T7-RD (25cm)	8.53	54.4	T9-LB (0-5cm)	6.81	42.3
T7-RD (50cm)	8.39	46.2	T9-LB (5-25cm)	7.13	33.9
T7-RE (0-5cm)	8.33	46	T9-LB (+200cm)	7.38	18.05
T7-RE (25cm)	8.25	36.2	T9-LB (25-50cm)	7.14	60.4
T7-RE (50cm)	8.2	48.5	T9-LB (50-100cm)	7.36	66
T8-A(0-5cm)	6.98	46.4	T9-LB (100-150cm)	7.43	39.5
T8-A(25cm)	6	42.6	T9-LB (150-200cm)	8	22
T8-A(50cm)	6.22	71	T9-RB (0-5cm)	7.64	30.8
T8-A(100-120cm)	5.3	82	T9-RB (5-25cm)	7.83	41.8
T8-LB(0-5cm)	8.17	53.4	T9-RB (25-50cm)	7.28	21.5
T8-LB(25cm)	6.94	63.4	T9-RB (50-100cm)	7.3	21.8
T8-LB(50cm)	8.3	81.9	T9-RB (100-150cm)	7.34	26.7
T8-LB(80cm)	8.46	52.1	T9-RB (150-200cm)	7.2	20.7
T8-LC(0-5cm)	4.245	1020	T9-RB (+200cm)	7.08	18.23

Resultados de FRX :

ID Campo	As		Ba		Cr		Cu	
	mg/Kg	% CV	mg/Kg	% CV	mg/Kg	% CV	mg/Kg	% CV
LD	5.00		30.00		10.00		9.00	
T1.1-A (0-5cm)	25.18	5.42	607.93	1.49	89.98	6.62	229.56	3.84
T1.1-A (5-30cm)	35.99	11.64	558.98	0.26	93.58	2.79	205.09	1.31
T1.1-A (30-40cm)	47.96	4.55	583.00	2.57	90.53	4.24	207.86	1.25



Laboratorio Nacional de Geoquímica y Minerología
Universidad Nacional Autónoma de México
Geoquímica Ambiental



ID Campo	Fe		Mn		Pb		Zn	
	%	% CV	mg/Kg	% CV	mg/Kg	% CV	mg/Kg	% CV
LD	0.10		40.00		6.00		7.00	
T1.1-A (0-5cm)	2.94	0.62	1334.30	1.33	91.26	1.85	196.78	2.97
T1.1-A (5-30cm)	3.07	0.41	1306.13	2.89	141.93	3.37	217.02	4.64
T1.1-A (30-40cm)	4.04	0.25	637.18	4.14	131.82	1.94	194.65	3.46

ID Campo	As		Ba		Cr		Cu	
	mg/Kg	% CV	mg/Kg	% CV	mg/Kg	% CV	mg/Kg	% CV
LD	5.00		30.00		10.00		9.00	
T1.1-A (40-100cm)	40.15	1.56	680.08	3.24	103.77	4.26	196.46	1.02
T1.1-A (>100cm)	45.89	3.00	535.35	5.39	107.95	4.57	278.97	0.54
T1.1-LB (0-5cm)	<LOD	NA	507.57	3.27	110.51	1.53	521.82	0.59
T1.1-LB (5-30cm)	32.60	8.94	501.14	3.70	112.37	6.12	438.34	0.43
T1.1-LB (30-60cm)	29.21	2.28	616.80	2.41	91.57	8.18	542.65	0.62
T1.1-LB (60-90cm)	17.55	8.22	665.05	3.16	105.51	2.96	132.11	1.10
T1.1-LB (90-120cm)	22.02	13.11	520.37	4.59	116.00	8.30	138.43	2.08
T1.1-LB (+120cm)	21.40	11.28	613.08	2.92	125.65	2.58	167.33	2.77
T1.1-RB (0-5cm)	48.63	8.78	682.09	1.73	116.25	2.27	239.23	2.30
T1.1-RB (5-25cm)	38.14	2.28	444.30	5.03	107.12	4.68	284.99	1.48
T1.1-RB (25-50cm)	46.36	0.73	434.10	7.25	96.66	2.70	294.44	2.66
T1.1-RB (50-100cm)	37.62	2.04	583.36	3.93	101.49	2.56	285.10	2.48
T1.1-RB (>100cm)	32.40	10.22	612.36	2.44	100.31	2.65	205.04	2.17
T2-A (0-5cm)	36.71	5.97	505.93	3.14	89.60	6.61	185.77	3.83
T2-A (25cm)	33.82	3.57	735.53	3.50	79.10	9.79	160.85	2.70
T2-A (50cm)	31.80	5.03	654.63	2.03	84.94	1.62	176.67	3.25
T2-A (100cm)	41.68	5.32	631.71	1.64	76.28	5.93	185.07	2.68
T2-A (150cm)	29.11	3.87	682.93	0.41	97.39	2.87	209.20	0.74
T2-A (200cm)	27.24	15.95	597.35	3.78	90.85	2.56	199.09	0.88
T2-A (240cm)	29.90	2.98	570.89	2.42	96.25	8.41	227.58	4.51
T2-LB (0-5cm)	31.29	8.85	669.66	4.61	95.57	6.51	259.90	1.79
T2-LB (25cm)	39.21	2.02	721.45	3.84	88.34	2.62	283.41	3.44
T2-LB (50cm)	39.69	4.11	613.30	2.29	84.71	1.68	270.06	0.55
T2-LB (100cm)	29.86	0.86	720.97	2.21	88.88	2.45	217.40	2.97
T2-LB (150cm)	30.03	9.86	726.96	3.82	97.13	8.01	306.25	2.04
T2-LB (200cm)	29.27	2.79	793.64	4.18	102.87	5.59	240.09	4.05
T2-LB (240cm)	29.54	3.71	717.91	4.14	92.77	1.82	258.23	1.13



**Laboratorio Nacional de Geoquímica y Minerología
Universidad Nacional Autónoma de México
Geoquímica Ambiental**



ID Campo	Fe		Mn		Pb		Zn	
	%	% CV	mg/Kg	% CV	mg/Kg	% CV	mg/Kg	% CV
LD	0.10		40.00		6.00		7.00	
T1.1-A (40-100cm)	3.75	0.11	619.50	2.78	117.24	2.27	189.69	1.54
T1.1-A (>100cm)	4.43	0.30	1945.54	0.87	156.09	2.04	249.71	2.34
T1.1-LB (0-5cm)	3.79	0.32	1356.38	1.72	548.61	0.72	240.85	2.04
T1.1-LB (5-30cm)	3.53	0.24	1240.54	1.54	102.06	1.69	230.96	2.41
T1.1-LB (30-60cm)	3.67	0.36	1480.80	3.76	108.50	1.16	236.62	2.46
T1.1-LB (60-90cm)	3.81	0.05	1684.48	1.98	93.25	2.46	251.22	1.14
T1.1-LB (90-120cm)	3.74	0.42	1570.02	1.16	96.26	2.60	276.03	0.77
T1.1-LB (+120cm)	3.70	0.38	2194.49	0.88	112.66	3.43	283.83	2.01
T1.1-RB (0-5cm)	3.88	0.22	1002.58	3.16	134.79	4.05	224.74	1.50
T1.1-RB (5-25cm)	3.70	0.35	1141.11	1.47	130.38	1.52	267.82	0.79
T1.1-RB (25-50cm)	3.57	0.23	825.43	1.33	128.17	1.68	236.49	2.12
T1.1-RB (50-100cm)	3.37	0.30	820.45	3.14	118.55	1.66	233.27	1.42
T1.1-RB (>100cm)	3.08	0.29	588.80	5.33	104.66	1.93	188.65	1.44
T2-A (0-5cm)	3.31	0.27	596.21	6.07	97.30	1.11	188.45	4.11
T2-A (25cm)	2.79	0.36	682.26	3.99	79.56	2.08	158.88	0.83
T2-A (50cm)	2.77	0.40	845.30	2.67	85.10	4.13	189.37	0.78
T2-A (100cm)	3.48	0.52	1030.55	3.22	101.31	2.70	200.98	3.73
T2-A (150cm)	3.45	0.37	1857.33	0.86	95.82	2.83	228.25	3.88
T2-A (200cm)	3.13	0.34	1219.49	3.39	84.49	3.32	224.64	1.24
T2-A (240cm)	3.62	0.41	1833.25	2.08	99.66	1.73	307.72	1.26
T2-LB (0-5cm)	2.84	0.50	908.88	1.92	79.39	3.50	206.19	2.26
T2-LB (25cm)	3.24	0.45	752.35	4.61	100.60	1.92	201.67	2.25
T2-LB (50cm)	3.15	0.13	1100.91	0.78	106.59	0.40	207.77	3.54
T2-LB (100cm)	2.89	0.24	1026.39	5.16	85.80	1.21	181.77	2.55
T2-LB (150cm)	3.55	0.10	1497.90	0.72	89.08	4.09	266.10	1.33
T2-LB (200cm)	3.69	0.11	1537.21	2.14	108.32	1.64	241.05	2.87
T2-LB (240cm)	3.64	0.14	2303.43	0.88	107.65	0.70	262.07	1.75

NA= No aplica

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Laboratorio Nacional de Geoquímica y Minerología
Universidad Nacional Autónoma de México
Geoquímica Ambiental



ID Campo	As		Ba		Cr		Cu	
	mg/Kg	% CV	mg/Kg	% CV	mg/Kg	% CV	mg/Kg	% CV
LD	5.00		30.00		10.00		9.00	
T2-RB (0-5cm)	20.79	6.76	619.39	1.67	77.15	4.81	154.23	3.03
T2-RB (25cm)	30.44	6.44	798.29	2.79	95.21	4.16	128.93	0.75
T2-RB (50cm)	31.70	5.62	668.95	3.06	91.33	0.76	182.66	2.58
T2-RB (100cm)	28.36	5.86	704.36	3.31	97.88	3.61	372.57	0.47
T2-RB (150cm)	33.75	9.59	646.72	3.45	93.97	3.78	254.16	1.24
T2-RB (200cm)	24.13	11.84	633.11	3.49	92.71	2.67	293.20	2.98
T2-RB (230cm)	26.93	6.50	654.32	3.25	95.07	2.27	272.75	2.02
T3-A (0-5cm)	33.71	4.85	684.53	0.76	154.63	3.64	164.43	1.54
T3-A (25cm)	29.05	5.41	385.14	1.39	122.71	7.64	127.58	2.28
T3-A (50cm)	32.01	3.75	763.69	1.20	129.04	5.64	165.04	2.47
T3-A (100cm)	28.91	3.95	809.00	1.94	113.11	5.06	200.74	3.31
T3-A (150cm)	24.03	11.27	733.24	0.22	126.26	3.28	245.90	1.55
T3-A (200cm)	27.12	6.59	688.48	0.67	133.30	3.17	359.67	2.51
T3-A (250cm)	28.56	7.23	628.95	0.72	135.14	4.26	488.47	0.89
T3-LB (0-5cm)	29.61	13.03	651.65	1.31	122.21	6.53	181.34	1.53
T3-LB (25cm)	33.90	3.50	718.81	1.34	127.17	4.37	181.34	3.37
T3-LB (50cm)	27.38	2.47	715.49	1.34	136.15	2.78	181.73	2.17
T3-LB (100cm)	11.72	18.94	727.97	2.68	117.20	3.75	184.87	5.72
T3-LB (150cm)	26.52	3.85	690.54	0.77	118.93	5.49	202.96	1.86
T3-LB (200cm)	28.49	9.30	463.25	1.88	143.64	5.87	185.75	1.83
T3-LB (250cm)	26.15	7.60	522.27	2.85	132.90	5.54	133.54	3.98
T3-LC (0-5cm)	23.72	2.86	703.96	2.29	133.17	5.28	85.46	3.90
T3-LC (25cm)	30.49	6.48	722.09	0.22	114.37	1.27	104.01	4.76
T3-LC (50cm)	25.56	16.27	678.63	2.07	132.87	2.33	91.42	5.90
T3-LC (100cm)	24.80	6.35	678.63	3.62	108.62	4.10	77.25	1.61
T3-LD (0-5cm)	21.29	16.33	723.05	0.64	116.16	6.00	66.74	1.46
T3-LD (25cm)	23.48	5.60	763.81	2.46	130.12	3.27	81.88	5.57
T3-LD (50cm)	24.22	4.76	760.75	1.79	146.84	2.32	72.94	3.97
T3-LD (100cm)	23.11	8.45	731.81	1.70	116.21	1.75	74.35	2.78
T3-LE (0-5cm)	25.94	6.57	486.55	1.36	153.12	2.32	121.84	6.83
T3-LE (25cm)	23.63	10.97	762.78	1.11	125.14	3.47	80.78	5.92
T3-LE (50cm)	24.22	5.33	733.94	2.50	125.95	1.98	73.43	4.80
T3-LE (100cm)	30.40	8.83	727.72	1.16	129.00	4.60	76.62	6.85



Laboratorio Nacional de Geoquímica y Minerología
Universidad Nacional Autónoma de México
Geoquímica Ambiental



ID Campo	Fe		Mn		Pb		Zn	
	%	% CV	mg/Kg	% CV	mg/Kg	% CV	mg/Kg	% CV
LD	0.10		40.00		6.00		7.00	
T2-RB (0-5cm)	1.98	0.50	625.04	3.63	56.03	4.54	173.40	1.50
T2-RB (25cm)	2.69	0.62	708.45	2.15	83.71	2.24	198.45	3.15
T2-RB (50cm)	3.11	0.60	1798.73	0.68	71.40	0.58	179.56	5.12
T2-RB (100cm)	3.62	0.55	1314.44	1.77	103.24	2.71	240.45	1.71
T2-RB (150cm)	3.52	0.63	1145.92	2.82	94.24	1.05	218.26	1.33
T2-RB (200cm)	3.20	0.64	1190.82	2.38	91.20	0.78	235.93	2.64
T2-RB (230cm)	3.66	0.09	1165.82	3.44	75.81	6.51	220.87	4.70
T3-A (0-5cm)	3.92	0.80	1105.27	1.34	100.91	1.57	178.43	1.66
T3-A (25cm)	2.55	0.02	1054.73	0.38	80.82	2.45	182.40	2.32
T3-A (50cm)	2.80	0.47	969.50	3.55	84.27	4.10	164.50	1.35
T3-A (100cm)	2.50	0.39	1054.88	0.41	71.17	0.87	163.24	2.87
T3-A (150cm)	2.51	0.05	1091.21	2.30	72.09	3.90	170.04	2.33
T3-A (200cm)	3.24	0.72	1202.96	1.77	75.58	4.23	218.08	2.54
T3-A (250cm)	3.43	0.39	1813.32	2.78	96.93	4.71	283.85	0.77
T3-LB (0-5cm)	2.52	0.09	817.31	4.09	75.56	2.18	166.59	2.98
T3-LB (25cm)	3.31	0.22	1325.97	2.44	80.14	3.13	184.00	3.47
T3-LB (50cm)	2.88	0.04	1095.48	2.20	86.91	0.59	176.91	1.28
T3-LB (100cm)	2.26	0.94	922.37	0.82	106.72	0.92	156.77	2.86
T3-LB (150cm)	2.27	0.62	801.26	1.97	62.66	2.18	170.28	1.11
T3-LB (200cm)	3.28	0.25	1356.97	1.65	90.70	3.28	228.87	1.70
T3-LB (250cm)	3.15	0.29	1214.02	3.98	90.19	0.97	210.08	0.79
T3-LC (0-5cm)	2.56	0.49	960.30	2.18	89.64	2.06	117.68	4.92
T3-LC (25cm)	2.82	0.49	1141.73	5.40	78.37	1.70	142.48	1.14
T3-LC (50cm)	3.07	0.54	923.02	4.58	71.58	5.05	128.05	1.17
T3-LC (100cm)	2.69	0.30	958.98	2.75	70.72	2.42	146.18	1.02
T3-LD (0-5cm)	2.48	0.46	964.88	1.63	73.26	4.66	113.55	2.17
T3-LD (25cm)	2.46	0.65	867.21	3.89	65.89	2.33	130.54	2.82
T3-LD (50cm)	2.23	0.10	859.05	2.13	59.38	2.07	124.67	2.32
T3-LD (100cm)	2.61	0.28	948.15	1.91	68.74	2.74	124.85	1.59
T3-LE (0-5cm)	3.03	0.46	994.48	2.90	71.60	2.75	152.64	2.44
T3-LE (25cm)	2.76	0.71	970.24	1.25	68.86	6.89	125.30	2.74
T3-LE (50cm)	2.65	0.10	943.58	1.72	64.60	4.31	121.53	3.99
T3-LE (100cm)	2.91	0.43	994.27	0.65	80.52	5.05	129.20	3.53

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Laboratorio Nacional de Geoquímica y Minerología
 Universidad Nacional Autónoma de México
 Geoquímica Ambiental



ID Campo	As		Ba		Cr		Cu	
	mg/Kg	% CV	mg/Kg	% CV	mg/Kg	% CV	mg/Kg	% CV
LD	5.00		30.00		10.00		9.00	
T3-RB (5cm)	27.45	8.92	656.40	1.57	121.90	3.00	132.78	3.20
T3-RB (25cm)	32.51	4.51	644.35	1.22	142.05	2.67	142.15	0.93
T3-RB (50cm)	38.95	7.48	758.32	2.01	137.05	4.79	190.67	4.79
T3-RB (100cm)	47.16	7.39	747.15	0.64	119.95	6.91	206.12	2.62
T3-RB (150cm)	33.47	5.93	739.42	3.06	117.96	0.53	304.22	2.51
T3-RC (0-5cm)	22.45	17.98	643.30	1.94	133.31	2.78	141.46	2.99
T3-RC (25cm)	26.91	0.39	640.89	2.48	122.48	8.73	111.03	7.02
T3-RC (50cm)	26.85	2.57	645.96	1.86	133.52	4.64	92.91	1.69
T3-RC (100cm)	20.50	1.24	789.05	0.63	118.20	2.60	77.72	3.69
T3-RD (5cm)	25.17	7.04	694.71	2.87	125.28	4.18	147.47	2.01
T3-RD (25cm)	26.35	7.12	575.17	1.44	133.61	3.87	153.22	4.33
T3-RD (50cm)	24.08	5.02	681.42	1.31	129.13	1.59	124.52	3.24
T3-RD (100cm)	22.88	7.14	646.75	2.67	132.07	3.38	100.82	5.46
T4-A (0-5cm)	27.41	1.36	769.95	2.23	97.52	4.06	134.07	1.69
T4-A (25cm)	28.22	7.99	741.36	0.43	93.85	3.65	151.75	2.49
T4-A (50cm)	43.08	10.86	779.07	3.75	91.33	10.40	153.37	2.20
T4-A (100cm)	46.88	5.38	779.94	3.79	100.35	1.59	207.07	1.07
T4-A (150cm)	28.65	5.97	811.61	1.10	86.71	2.50	159.69	1.60
T4-A (200cm)	41.98	6.56	785.02	3.21	83.07	3.34	229.27	4.98
T4-A (250cm)	25.74	12.95	581.42	1.12	91.73	4.41	117.13	2.85
T4-LB (0-5cm)	20.30	8.76	704.16	5.61	102.22	5.70	125.53	0.93
T4-LB (25cm)	26.33	9.50	744.18	6.27	95.09	4.93	122.27	0.84
T4-LB (50cm)	44.68	4.97	743.33	0.67	98.72	3.67	158.67	1.64
T4-LB (50-100cm)	40.68	4.11	676.18	1.59	97.12	1.77	184.97	3.54
T4-LB (100-150cm)	26.59	4.77	842.26	5.36	97.96	2.65	222.76	2.47
T4-LB (150-200cm)	26.85	4.38	708.38	5.52	98.59	4.36	119.76	2.32
T4-LB (200-300cm)	33.19	14.45	824.43	1.71	100.68	7.78	96.09	4.37
T4-LB (340cm)	28.42	5.72	645.12	1.85	122.96	4.73	93.69	3.78
T4-RB (0-5cm)	27.99	8.79	617.04	3.97	105.33	2.00	167.31	3.78
T4-RB (10-30cm)	43.32	4.91	655.88	1.55	100.26	2.32	203.92	1.92
T4-RB (50cm)	21.93	11.10	825.46	2.65	89.28	3.82	105.68	4.35
T4-RB (100cm)	23.82	8.64	860.66	1.17	191.27	1.71	83.09	2.14
T4-RB (150cm)	24.72	3.63	702.18	2.28	112.03	2.00	83.57	5.43
T4-RB (200cm)	20.67	10.07	716.70	2.66	91.65	4.79	76.85	2.70
T4-RB (250-270cm)	31.26	7.09	793.78	5.03	99.18	4.42	112.82	6.02



Laboratorio Nacional de Geoquímica y Minerología
 Universidad Nacional Autónoma de México
 Geoquímica Ambiental



ID Campo	Fe		Mn		Pb		Zn	
	%	% CV	mg/Kg	% CV	mg/Kg	% CV	mg/Kg	% CV
LD	0.10		40.00		6.00		7.00	
T3-RB (5cm)	2.45	0.35	685.58	1.32	66.28	3.35	143.16	2.48
T3-RB (25cm)	3.11	0.19	890.67	1.18	102.55	2.31	158.48	0.59
T3-RB (50cm)	3.58	0.07	1410.79	2.26	98.21	4.22	175.03	1.73
T3-RB (100cm)	3.01	0.29	1187.70	1.92	96.49	3.01	170.09	0.92
T3-RB (150cm)	3.27	0.41	1322.91	0.35	87.65	0.39	200.81	0.45
T3-RC (0-5cm)	3.16	0.21	1141.31	2.25	88.78	3.15	195.01	2.48
T3-RC (25cm)	2.98	0.23	1061.95	1.74	80.52	0.42	173.08	2.03
T3-RC (50cm)	2.96	0.29	1251.50	1.24	71.51	1.47	151.05	5.26
T3-RC (100cm)	2.66	0.21	1233.00	0.82	82.72	0.81	140.93	3.19
T3-RD (5cm)	3.05	0.05	1103.13	2.72	85.70	1.50	195.07	2.71
T3-RD (25cm)	3.06	0.14	1327.68	3.31	101.55	2.44	224.48	0.98
T3-RD (50cm)	3.13	0.04	1465.12	1.91	82.02	2.79	187.68	1.16
T3-RD (100cm)	2.98	0.39	1271.20	0.33	84.28	3.05	195.30	1.89
T4-A (0-5cm)	2.57	0.10	860.65	2.11	74.10	3.35	159.84	1.84
T4-A (25cm)	2.97	0.16	973.51	2.22	98.09	3.87	160.60	1.55
T4-A (50cm)	3.18	0.22	904.04	3.39	81.16	5.23	147.83	0.39
T4-A (100cm)	3.72	0.47	1359.45	0.62	97.12	1.78	177.35	3.38
T4-A (150cm)	2.40	0.15	785.26	4.71	67.81	3.49	165.54	2.34
T4-A (200cm)	3.46	0.84	1028.52	3.22	83.71	3.65	195.78	3.32
T4-A (250cm)	2.86	0.17	1164.32	0.94	73.95	2.70	200.29	2.71
T4-LB (0-5cm)	2.64	0.34	907.04	1.96	100.74	3.27	157.08	0.15
T4-LB (25cm)	2.70	0.28	704.24	4.50	61.27	1.60	138.93	3.31
T4-LB (50cm)	3.34	0.25	691.94	3.92	90.74	4.14	138.82	1.80
T4-LB (50-100cm)	2.77	0.49	795.93	4.99	76.81	1.94	160.94	2.90
T4-LB (100-150cm)	2.46	0.41	1219.32	0.36	51.26	3.26	160.40	4.23
T4-LB (150-200cm)	2.77	0.76	1383.37	1.63	75.51	1.95	230.75	2.44
T4-LB (200-300cm)	3.28	0.42	1455.46	2.88	89.62	4.86	179.47	3.16
T4-LB (340cm)	3.07	0.19	1389.15	3.36	81.70	4.52	183.07	3.70
T4-RB (0-5cm)	3.24	0.47	1352.05	1.78	88.60	0.33	205.52	2.06
T4-RB (10-30cm)	3.23	0.49	802.28	2.04	81.83	3.21	154.96	2.66
T4-RB (50cm)	2.20	0.24	1105.06	4.60	67.63	3.01	164.88	1.17
T4-RB (100cm)	3.16	0.24	967.10	1.58	64.08	4.68	163.12	3.82
T4-RB (150cm)	2.68	0.44	971.03	1.15	73.63	5.27	150.37	1.08
T4-RB (200cm)	2.61	0.30	849.51	3.35	80.37	4.09	135.63	4.34
T4-RB (250-270cm)	3.86	0.31	1717.79	1.54	107.19	1.74	172.05	1.80



Laboratorio Nacional de Geoquímica y Minerología
Universidad Nacional Autónoma de México
Geoquímica Ambiental



ID Campo	As		Ba		Cr		Cu	
	mg/Kg	% CV	mg/Kg	% CV	mg/Kg	% CV	mg/Kg	% CV
LD	5.00		30.00		10.00		9.00	
T5-A (0-5cm)	27.24	4.97	481.39	3.42	183.83	1.28	96.66	3.83
T5-A (25cm)	46.69	4.38	548.93	16.39	153.68	3.24	125.40	6.19
T5-A (50cm)	32.74	1.50	630.84	2.71	149.09	4.22	119.08	1.14
T5-A (100cm)	34.61	7.98	604.05	2.63	159.41	3.81	131.55	1.04
T5-A (150cm)	23.75	2.38	665.98	1.07	155.57	0.69	132.42	2.84
T5-A (200cm)	40.88	0.52	299.25	2.24	167.63	1.60	180.92	1.38
T5-A (250cm)	29.58	6.64	423.31	0.41	164.20	2.07	218.23	1.99
T5-LB (0-5cm)	29.15	1.03	686.96	0.95	162.32	1.65	112.71	4.28
T5-LB (25cm)	36.05	3.71	558.97	3.92	176.32	1.94	212.99	0.61
T5-LB (50cm)	39.99	3.99	443.10	1.18	169.17	1.08	252.44	2.62
T5-LB (100cm)	75.77	2.66	588.97	0.81	147.19	6.40	243.94	2.45
T5-LB (150cm)	27.16	3.45	455.13	1.97	156.39	1.75	557.79	1.03
T5-LB (200cm)	23.89	14.11	503.42	4.17	143.51	4.80	115.43	5.62
T5-LC (0-5cm)	25.92	5.95	383.70	10.42	137.14	3.55	165.85	1.52
T5-LC (25cm)	26.07	9.96	396.90	4.66	125.19	1.38	138.56	1.58
T5-LC (50cm)	24.41	13.18	579.24	4.35	109.28	1.47	121.39	3.84
T5-LD (0-5cm)	24.01	7.00	319.86	9.19	126.15	0.87	143.19	0.90
T5-LD (25cm)	22.30	12.39	312.95	2.47	134.67	5.96	136.68	3.17
T5-LD (50cm)	27.46	2.42	409.59	7.19	118.92	1.69	141.26	1.81
T5-LE (0-5cm)	26.52	10.28	365.78	4.91	141.35	2.49	144.00	1.20
T5-LE (25cm)	26.02	13.91	392.53	1.25	127.15	2.27	154.08	3.48
T5-LE (50cm)	27.01	0.87	317.46	8.43	128.00	3.40	144.03	1.97
T5-RB (0-5cm)	43.63	3.39	531.96	3.07	133.52	2.97	140.29	2.44
T5-RB (25cm)	35.28	5.12	542.34	2.63	161.59	3.95	148.07	1.66
T5-RB (50cm)	39.82	5.10	795.81	6.05	133.67	2.87	151.97	4.17
T5-RB (100cm)	26.52	3.56	617.39	1.12	163.00	1.82	139.34	1.74
T5-RB (150cm)	30.15	1.51	581.39	1.00	174.74	5.27	75.13	5.55
T5-RB (200cm)	25.62	6.81	557.82	1.14	168.69	3.59	95.89	4.51
T5-RC (0-5cm)	26.89	3.75	575.93	1.53	133.28	0.75	110.58	2.86
T5-RC (25cm)	26.81	8.33	703.50	4.73	131.31	1.75	118.46	2.14
T5-RC (50cm)	23.63	4.02	385.54	2.56	148.65	1.54	90.83	2.48
T5-RD (0-5cm)	25.94	1.04	309.01	3.78	120.90	3.00	139.89	3.22
T5-RD (25cm)	21.22	12.40	352.65	2.58	133.07	1.76	145.98	2.92
T5-RD (50cm)	20.59	5.05	532.45	1.29	138.84	1.51	118.33	1.31



**Laboratorio Nacional de Geoquímica y Minerología
Universidad Nacional Autónoma de México
Geoquímica Ambiental**



ID Campo	Fe		Mn		Pb		Zn	
	%	% CV	mg/Kg	% CV	mg/Kg	% CV	mg/Kg	% CV
LD	0.10		40.00		6.00		7.00	
T5-A (0-5cm)	2.16	0.41	534.00	3.00	56.93	0.31	127.85	3.51
T5-A (25cm)	3.18	0.83	833.90	4.79	89.79	2.82	138.96	4.65
T5-A (50cm)	2.41	0.26	575.25	2.52	70.04	2.26	124.07	1.79
T5-A (100cm)	2.11	0.15	557.31	0.50	67.09	2.74	126.44	0.77
T5-A (150cm)	1.82	0.69	600.32	3.12	67.89	1.17	141.64	2.30
T5-A (200cm)	3.37	0.18	1075.81	1.11	87.83	4.11	168.14	2.92
T5-A (250cm)	2.44	0.42	879.12	1.79	68.48	1.19	183.30	3.00
T5-LB (0-5cm)	2.42	0.61	834.06	0.46	61.89	3.06	136.20	0.74
T5-LB (25cm)	3.01	0.06	784.45	3.47	79.25	1.43	146.30	0.60
T5-LB (50cm)	3.08	0.58	662.13	1.21	73.25	3.26	142.82	2.02
T5-LB (100cm)	3.45	0.21	934.42	3.83	87.76	2.10	141.35	0.88
T5-LB (150cm)	3.19	0.59	1260.73	1.23	86.46	2.29	361.14	1.47
T5-LB (200cm)	2.82	0.42	1205.84	1.41	77.07	5.36	200.04	1.18
T5-LC (0-5cm)	3.68	0.11	1410.04	1.53	101.13	1.84	257.26	2.11
T5-LC (25cm)	3.48	0.48	1302.06	1.04	92.81	1.25	224.06	3.10
T5-LC (50cm)	3.41	0.43	1149.59	1.31	76.86	1.16	198.14	1.40
T5-LD (0-5cm)	3.53	0.53	1381.35	0.50	96.71	0.26	246.79	1.73
T5-LD (25cm)	3.41	0.65	1294.44	1.90	95.21	4.92	244.29	1.42
T5-LD (50cm)	3.69	0.69	1406.83	1.00	97.70	2.84	256.44	1.79
T5-LE (0-5cm)	3.42	0.08	1313.58	1.84	96.01	2.98	238.24	1.87
T5-LE (25cm)	3.71	0.34	1396.27	1.62	103.03	4.63	262.69	2.10
T5-LE (50cm)	3.68	0.19	1322.69	2.36	100.37	1.05	255.83	1.20
T5-RB (0-5cm)	3.08	0.31	808.54	1.33	88.86	1.87	146.73	2.24
T5-RB (25cm)	2.99	0.43	993.52	0.30	105.70	0.62	144.21	2.50
T5-RB (50cm)	2.83	0.13	1129.96	1.00	127.58	2.36	143.56	0.64
T5-RB (100cm)	2.28	0.55	1049.23	2.27	71.68	2.98	175.86	0.64
T5-RB (150cm)	2.73	0.19	1176.71	2.98	83.26	1.36	143.97	1.33
T5-RB (200cm)	2.17	0.57	869.78	2.44	69.42	0.88	155.31	2.76
T5-RC (0-5cm)	2.74	0.80	979.07	0.09	79.81	1.37	148.30	1.32
T5-RC (25cm)	3.33	0.49	1282.56	2.34	85.82	1.52	148.70	3.62
T5-RC (50cm)	2.84	0.16	961.32	2.69	78.45	3.60	135.90	2.60
T5-RD (0-5cm)	3.59	0.17	1266.86	1.01	91.20	2.20	240.19	0.67
T5-RD (25cm)	3.37	0.28	1236.22	0.98	94.30	3.59	235.67	1.74
T5-RD (50cm)	3.19	0.26	1117.72	4.60	85.68	2.61	186.22	1.61



Laboratorio Nacional de Geoquímica y Minerología
Universidad Nacional Autónoma de México
Geoquímica Ambiental



ID Campo	As		Ba		Cr		Cu	
	mg/Kg	% CV	mg/Kg	% CV	mg/Kg	% CV	mg/Kg	% CV
LD	5.00		30.00		10.00		9.00	
T5-RE (0-5cm)	24.14	9.31	251.32	9.06	132.02	3.49	147.21	2.29
T5-RE (25cm)	23.44	6.79	334.83	2.19	142.16	4.41	145.91	4.51
T5-RE (50cm)	23.55	8.90	597.95	4.23	123.00	5.24	132.53	3.52
T6-A (0-5cm)	30.52	7.64	855.67	6.11	146.07	1.61	101.81	6.05
T6-A (25cm)	41.82	10.28	809.98	4.28	193.73	2.84	105.46	4.27
T6-A (50cm)	37.89	2.38	933.80	0.69	218.58	2.50	94.68	2.02
T6-A (100cm)	21.87	1.17	464.56	1.40	724.68	0.26	98.54	0.86
T6-A (150cm)	25.66	6.15	532.35	3.30	141.21	2.80	102.72	4.69
T6-A (200cm)	22.51	2.48	684.66	0.51	104.26	1.45	101.24	1.14
T6-LB (0-5cm)	26.39	7.42	644.14	1.34	109.24	3.31	181.83	5.53
T6-LB (25cm)	24.19	8.43	697.80	5.26	110.80	2.73	133.98	2.41
T6-LB (50cm)	22.16	10.72	650.59	2.91	99.43	4.59	81.33	4.52
T6-LB (100cm)	23.75	3.79	631.39	3.94	101.57	4.86	100.60	3.33
T6-LB (150cm)	22.96	5.37	787.77	2.25	96.95	2.43	83.24	1.30
T6-LB (200cm)	28.88	6.04	762.89	1.95	89.68	1.56	85.70	2.33
T6-LB (250cm)	26.96	9.07	605.00	1.73	105.89	1.23	133.98	2.03
T6-RB (5cm)	24.14	7.03	739.78	1.89	113.48	1.77	122.63	4.92
T6-RB (25cm)	38.86	1.44	719.68	2.00	125.13	4.40	145.95	2.83
T6-RB (50cm)	38.70	4.74	776.46	1.66	114.41	0.47	118.29	6.15
T6-RB (100cm)	37.85	6.60	345.89	3.37	129.81	3.34	378.78	2.18
T6-RB (150cm)	25.88	8.98	316.62	3.26	139.92	3.75	108.09	2.11
T6-RB (200cm)	26.55	4.34	385.43	1.87	125.55	6.33	108.69	1.22
T7-A (0-5cm)	36.32	3.50	703.64	3.80	143.05	4.03	97.29	1.05
T7-A (25cm)	51.88	6.13	740.50	7.21	168.80	0.25	97.59	2.52
T7-A (50cm)	21.44	4.53	851.91	2.91	142.93	2.18	98.75	5.84
T7-A (100cm)	26.97	3.16	791.40	1.71	263.71	0.25	104.40	2.80
T7-A (150cm)	38.74	5.34	634.78	3.21	607.41	1.01	106.49	5.80
T7-A (200cm)	26.64	3.56	598.86	3.53	1076.15	1.50	96.04	1.28
T7-A (250cm)	26.69	7.12	526.01	6.85	585.94	1.19	95.95	3.43
T7-LB (0-5cm)	22.20	8.09	889.53	0.17	249.17	1.65	98.66	4.75
T7-LB (25cm)	33.76	7.30	608.30	1.92	190.20	3.20	101.53	3.17
T7-LB (50cm)	39.84	6.01	380.39	6.64	151.91	1.77	93.52	3.05
T7-LB (100cm)	35.48	5.77	674.47	3.65	120.36	3.12	100.49	1.71
T7-LB (150cm)	33.06	13.82	717.61	3.00	101.39	1.66	93.15	0.55
T7-LB (200cm)	29.23	5.80	564.72	2.89	150.89	1.22	111.38	1.17



**Laboratorio Nacional de Geoquímica y Minerología
Universidad Nacional Autónoma de México
Geoquímica Ambiental**



ID Campo	Fe		Mn		Pb		Zn	
	%	% CV	mg/Kg	% CV	mg/Kg	% CV	mg/Kg	% CV
LD	0.10		40.00		6.00		7.00	
T5-RE (0-5cm)	3.60	0.22	1405.00	0.66	98.48	1.60	267.91	1.41
T5-RE (25cm)	3.39	0.34	1266.48	1.11	90.88	2.57	229.43	2.14
T5-RE (50cm)	3.42	0.66	1222.77	0.72	83.06	3.64	213.61	2.22
T6-A (0-5cm)	3.16	0.16	782.40	3.09	66.80	6.67	149.42	0.45
T6-A (25cm)	3.36	0.31	858.46	3.36	72.14	3.79	132.94	4.07
T6-A (50cm)	2.91	0.40	775.59	2.58	71.77	1.66	142.10	1.90
T6-A (100cm)	3.06	0.33	1383.33	1.21	74.20	1.96	434.32	0.69
T6-A (150cm)	3.35	0.29	1269.95	2.94	86.90	3.30	228.22	3.16
T6-A (200cm)	2.72	0.59	1045.29	2.75	73.53	3.57	161.03	1.60
T6-LB (0-5cm)	3.37	0.17	1021.13	2.18	80.57	2.01	150.30	1.21
T6-LB (25cm)	3.00	0.24	1146.92	1.16	67.75	1.94	139.49	2.09
T6-LB (50cm)	2.47	0.60	821.52	4.35	66.00	2.73	135.09	2.24
T6-LB (100cm)	3.03	0.11	1123.47	0.89	78.25	2.98	154.78	3.05
T6-LB (150cm)	2.98	0.62	1228.76	3.76	67.81	3.16	130.53	2.95
T6-LB (200cm)	2.54	0.58	918.49	1.83	65.92	1.61	141.51	4.58
T6-LB (250cm)	3.54	0.73	1294.94	2.74	96.49	3.54	223.09	1.78
T6-RB (5cm)	2.58	0.24	811.00	0.70	64.44	4.00	141.47	1.49
T6-RB (25cm)	3.03	0.21	1005.41	2.89	68.26	2.79	120.51	1.42
T6-RB (50cm)	2.63	0.35	601.50	3.64	65.39	2.84	126.15	2.37
T6-RB (100cm)	3.73	0.40	1207.00	2.30	89.48	2.63	255.54	0.54
T6-RB (150cm)	3.15	0.29	1154.66	1.54	82.03	3.97	208.81	1.36
T6-RB (200cm)	3.32	0.35	1198.52	1.33	87.25	1.41	216.13	1.50
T7-A (0-5cm)	3.12	0.48	962.71	2.57	75.26	0.68	145.97	1.38
T7-A (25cm)	3.37	0.44	1051.11	3.53	79.32	5.30	164.60	1.67
T7-A (50cm)	2.97	0.46	917.67	2.54	69.54	1.08	126.79	2.51
T7-A (100cm)	2.55	0.20	1369.32	1.27	68.67	0.68	147.00	0.70
T7-A (150cm)	3.37	0.65	1048.95	1.31	73.26	4.03	213.03	1.30
T7-A (200cm)	3.18	0.25	1366.14	1.90	79.78	2.80	218.80	0.59
T7-A (250cm)	3.73	0.30	1612.20	2.20	100.89	2.19	298.08	1.89
T7-LB (0-5cm)	2.98	0.19	973.76	2.47	58.34	3.64	139.74	2.28
T7-LB (25cm)	3.36	0.12	1293.58	0.63	84.00	3.06	226.33	3.66
T7-LB (50cm)	3.33	0.23	1069.88	2.99	92.43	1.78	224.22	0.17
T7-LB (100cm)	3.41	0.65	1040.95	1.24	76.52	3.86	168.77	1.13
T7-LB (150cm)	2.78	0.39	811.35	2.00	63.46	4.48	141.07	2.50
T7-LB (200cm)	3.59	0.31	1422.33	2.02	105.69	1.51	260.73	0.38



Laboratorio Nacional de Geoquímica y Minerología
Universidad Nacional Autónoma de México
Geoquímica Ambiental



ID Campo	As		Ba		Cr		Cu	
	mg/Kg	% CV	mg/Kg	% CV	mg/Kg	% CV	mg/Kg	% CV
LD	5.00		30.00		10.00		9.00	
T7-LC (0-5cm)	18.60	6.48	702.29	2.82	128.09	0.87	99.73	3.03
T7-LC (25cm)	20.10	3.49	821.65	2.02	95.68	2.53	96.21	5.72
T7-LC (50cm)	18.97	14.16	735.58	0.59	118.77	1.05	105.77	1.57
T7-LD (0-5cm)	18.12	3.72	766.96	1.27	109.79	3.65	118.29	2.35
T7-LD (25cm)	22.35	8.05	670.96	3.12	136.87	5.11	102.93	0.85
T7-LD (50cm)	20.33	14.72	839.97	2.08	97.08	2.07	100.97	1.59
T7-RB (0-5cm)	51.13	4.91	837.90	1.11	172.41	1.83	107.22	1.08
T7-RB (25cm)	58.38	4.32	720.44	1.03	144.24	1.73	91.62	6.47
T7-RB (50cm)	52.19	6.26	856.71	2.08	171.15	3.03	102.73	1.74
T7-RB (100cm)	25.96	3.33	674.28	2.94	282.29	2.27	106.62	7.18
T7-RB (150cm)	42.97	4.26	597.29	2.04	137.56	0.67	96.65	2.45
T7-RB (200cm)	30.35	1.71	624.51	0.84	152.55	2.27	100.95	4.40
T7-RC (0-5cm)	34.98	8.48	644.76	3.47	103.91	2.01	95.93	3.67
T7-RC (25cm)	21.23	2.29	549.20	3.90	105.69	0.20	111.63	2.09
T7-RC (50cm)	22.06	6.75	570.58	2.70	105.30	4.85	121.01	3.20
T7-RD (0-5cm)	29.63	11.85	641.60	3.84	116.36	2.99	93.09	2.69
T7-RD (25cm)	37.86	10.28	528.61	2.47	116.39	2.59	97.12	3.30
T7-RD (50cm)	37.65	5.68	692.70	5.13	103.45	1.28	94.67	7.94
T7-RE (0-5cm)	34.41	8.98	710.06	5.81	165.04	2.44	96.35	7.37
T7-RE (25cm)	28.76	8.92	706.15	1.90	101.08	2.50	91.50	3.53
T7-RE (50cm)	37.91	5.56	638.42	4.02	123.54	0.89	99.64	7.73
T8-A(0-5cm)	36.73	10.14	706.03	2.57	100.80	4.15	207.14	1.43
T8-A(25cm)	31.60	3.97	693.66	3.67	97.10	4.23	230.38	1.08
T8-A(50cm)	39.38	2.91	383.87	2.14	91.46	3.16	227.59	2.54
T8-A(100-120cm)	29.61	6.53	569.63	3.38	96.26	0.99	276.73	2.27
T8-LB(0-5cm)	45.97	2.92	856.97	0.98	114.24	4.88	226.93	1.14
T8-LB(25cm)	33.67	5.69	677.60	4.06	96.65	1.71	230.91	2.36
T8-LB(50cm)	30.13	2.40	501.26	1.97	141.76	5.08	134.26	3.81
T8-LB(80cm)	28.51	12.56	767.32	1.03	135.19	0.73	80.08	2.27
T8-LC(0-5cm)	41.89	4.72	608.76	3.57	102.75	3.25	675.27	0.79
T8-LC(90cm)	23.32	7.88	434.90	2.98	111.37	6.31	85.76	4.05



Laboratorio Nacional de Geoquímica y Minerología
Universidad Nacional Autónoma de México
Geoquímica Ambiental



ID Campo	Fe		Mn		Pb		Zn	
	%	% CV	mg/Kg	% CV	mg/Kg	% CV	mg/Kg	% CV
LD	0.10		40.00		6.00		7.00	
T7-LC (0-5cm)	3.03	0.53	878.01	2.80	56.86	1.04	129.45	4.94
T7-LC (25cm)	2.72	0.12	963.92	4.96	55.82	3.06	136.26	3.15
T7-LC (50cm)	3.02	0.09	1005.17	2.91	69.51	3.55	149.02	0.92
T7-LD (0-5cm)	3.32	0.34	1274.37	2.59	63.82	4.68	128.99	3.82
T7-LD (25cm)	2.75	0.59	973.89	2.83	63.85	3.66	144.15	1.32
T7-LD (50cm)	3.24	0.70	942.82	1.23	54.85	3.34	113.01	2.04
T7-RB (0-5cm)	4.47	0.42	1138.40	0.48	93.77	7.41	170.71	2.85
T7-RB (25cm)	3.41	0.01	1013.50	3.86	115.69	1.36	149.43	2.18
T7-RB (50cm)	4.88	0.36	1452.21	4.47	91.36	1.00	171.29	2.49
T7-RB (100cm)	3.39	0.41	1048.87	3.63	79.29	2.36	197.27	0.69
T7-RB (150cm)	3.20	0.17	981.28	5.10	82.70	2.19	173.68	1.88
T7-RB (200cm)	3.48	0.61	1403.18	1.19	100.20	0.98	246.18	2.82
T7-RC (0-5cm)	3.26	0.58	1010.64	1.84	75.90	2.30	131.84	0.35
T7-RC (25cm)	3.36	0.19	1128.03	1.68	66.20	5.96	169.29	4.41
T7-RC (50cm)	3.30	0.32	982.15	2.96	68.18	0.43	162.58	2.32
T7-RD (0-5cm)	2.89	0.30	860.44	4.42	76.53	2.11	137.62	1.32
T7-RD (25cm)	3.06	0.40	851.13	4.49	85.99	3.43	151.42	2.78
T7-RD (50cm)	3.15	0.67	821.20	2.35	100.89	3.32	137.64	2.28
T7-RE (0-5cm)	2.95	0.40	860.92	1.70	84.29	5.01	141.14	3.28
T7-RE (25cm)	2.85	0.19	786.77	0.56	74.82	5.25	132.00	1.35
T7-RE (50cm)	3.00	0.24	935.04	1.47	106.17	3.29	157.07	1.32
T8-A(0-5cm)	2.83	0.28	706.78	3.32	67.59	5.80	143.06	3.76
T8-A(25cm)	2.38	0.11	752.74	0.84	69.06	3.24	134.99	5.14
T8-A(50cm)	2.56	0.30	683.46	0.68	70.92	2.74	164.38	2.66
T8-A(100-120cm)	2.91	0.65	773.41	2.33	63.53	3.99	136.52	2.21
T8-LB(0-5cm)	3.81	0.21	1065.67	2.41	84.05	2.94	156.29	4.90
T8-LB(25cm)	2.94	0.43	962.27	1.78	88.55	1.36	154.30	1.65
T8-LB(50cm)	2.86	0.38	866.93	1.01	79.51	2.95	148.65	3.83
T8-LB(80cm)	3.13	0.28	871.46	3.02	60.02	4.61	128.39	5.28
T8-LC(0-5cm)	3.94	0.59	727.31	4.79	72.05	1.84	196.29	1.83
T8-LC(90cm)	3.11	0.33	847.84	1.37	54.89	3.83	130.37	1.98



Laboratorio Nacional de Geoquímica y Minerología
Universidad Nacional Autónoma de México
Geoquímica Ambiental



ID Campo	As		Ba		Cr		Cu	
	mg/Kg	% CV	mg/Kg	% CV	mg/Kg	% CV	mg/Kg	% CV
LD	5.00		30.00		10.00		9.00	
T9-A (0-5cm)	35.31	7.92	749.28	1.80	130.49	3.19	223.61	2.68
T9-A (5-25cm)	34.20	9.50	726.62	2.71	129.38	9.69	210.44	2.75
T9-A (25-50cm)	33.05	8.11	773.60	3.01	114.82	4.11	143.38	2.30
T9-A (50-100cm)	37.45	5.77	810.88	1.03	129.41	1.85	116.32	1.80
T9-A (100-150cm)	31.31	4.77	459.41	2.34	137.98	2.83	119.68	4.47
T9-A (150-170cm)	35.42	4.76	596.87	2.71	129.13	4.23	133.03	4.22
T9-A (170-200cm)	27.28	5.07	784.78	1.98	146.66	2.33	82.62	12.10
T9-A (+200cm)	22.42	3.03	884.26	1.25	156.97	1.23	66.87	7.80
T9-LB (0-5cm)	29.02	1.78	763.50	0.78	107.06	5.92	166.21	2.22
T9-LB (5-25cm)	30.24	5.82	602.74	4.87	99.17	1.76	130.33	2.74
T9-LB (+200cm)	29.84	7.16	721.39	3.33	142.23	4.21	100.99	1.10
T9-LB (25-50cm)	32.29	5.36	713.05	2.18	114.23	5.43	144.65	2.56
T9-LB (50-100cm)	33.06	3.03	588.06	5.68	111.04	6.53	159.28	2.27
T9-LB (100-150cm)	32.86	3.72	704.20	0.88	106.54	4.35	457.89	1.06
T9-LB (150-200cm)	29.89	4.00	758.95	1.98	142.09	6.56	451.10	1.95
T9-RB (0-5cm)	41.74	10.42	705.20	1.18	157.29	2.98	188.87	4.57
T9-RB (5-25cm)	32.06	4.07	772.60	1.58	119.67	4.92	204.80	2.31
T9-RB (25-50cm)	32.51	5.12	763.53	1.40	114.01	6.50	234.38	3.99
T9-RB (50-100cm)	36.35	7.58	747.32	1.05	122.41	3.73	169.29	1.26
T9-RB (100-150cm)	34.11	1.45	856.27	3.64	114.85	5.06	143.68	1.66
T9-RB (150-200cm)	27.27	5.87	882.64	2.98	122.86	8.30	67.67	0.64
T9-RB (+200cm)	26.40	2.82	802.24	2.39	128.09	0.77	104.42	6.40

ID Campo	Fe		Mn		Pb		Zn	
	%	% CV	mg/Kg	% CV	mg/Kg	% CV	mg/Kg	% CV
LD	0.10		40.00		6.00		7.00	
T9-A (0-5cm)	3.45	0.33	979.20	4.44	71.72	0.93	156.81	1.11
T9-A (5-25cm)	2.64	0.32	826.71	1.24	68.87	3.29	133.71	3.54
T9-A (25-50cm)	2.80	0.38	801.70	1.22	64.23	8.38	134.88	3.27
T9-A (50-100cm)	2.62	0.30	745.61	3.98	57.18	6.01	116.84	5.39
T9-A (100-150cm)	2.57	0.35	796.72	2.42	67.70	1.21	125.06	1.35
T9-A (150-170cm)	2.73	0.15	839.87	4.27	63.57	4.04	131.78	1.17
T9-A (170-200cm)	2.90	0.07	768.90	1.39	59.48	1.78	110.99	2.98
T9-A (+200cm)	2.76	0.28	1230.88	2.24	53.75	0.57	97.72	6.01



**Laboratorio Nacional de Geoquímica y Minerología
Universidad Nacional Autónoma de México
Geoquímica Ambiental**



ID Campo	Fe		Mn		Pb		Zn	
	%	% CV	mg/Kg	% CV	mg/Kg	% CV	mg/Kg	% CV
LD	0.10		40.00		6.00		7.00	
T9-LB (0-5cm)	3.41	0.32	932.61	2.13	68.85	3.71	153.86	3.75
T9-LB (5-25cm)	2.94	0.06	726.70	1.48	59.92	1.62	124.14	1.87
T9-LB (+200cm)	3.02	0.67	803.97	0.32	55.80	3.56	126.30	2.40
T9-LB (25-50cm)	4.10	0.50	1202.18	1.15	78.59	2.24	138.26	2.75
T9-LB (50-100cm)	3.33	0.11	1014.75	2.74	71.06	1.48	141.09	1.25
T9-LB (100-150cm)	3.02	0.19	897.77	1.50	69.88	0.64	132.77	6.17
T9-LB (150-200cm)	2.76	0.06	954.88	2.31	53.73	0.38	127.38	2.30
T9-RB (0-5cm)	6.21	0.56	1353.07	3.76	88.67	3.39	138.74	3.34
T9-RB (5-25cm)	2.51	0.45	705.13	1.84	63.41	3.38	131.89	1.54
T9-RB (25-50cm)	2.39	0.36	696.82	2.09	65.76	2.40	130.62	2.63
T9-RB (50-100cm)	2.53	0.61	871.12	4.03	60.27	1.31	142.86	0.17
T9-RB (100-150cm)	2.82	0.09	1621.01	0.20	74.04	1.46	153.54	1.04
T9-RB (150-200cm)	2.84	0.23	779.64	0.47	51.13	3.37	101.92	2.05
T9-RB (+200cm)	2.51	0.28	682.97	2.65	62.50	0.43	104.82	0.68

NA= No aplica

<LOD= Debajo del límite de detección.

CONTROL DE CALIDAD

pH y CE:

Para la precisión de los análisis de pH se determinaron algunas mediciones por duplicado reportando un %DPR de las mediciones (menor al 10%).

ID campo	pH	CE	%DPR pH	%DPR CE
T5-RE(50)	6.6	246	0.75	6.68
	6.65	263		
T5-RB(100)	5.69	294	5.64	3.11
	6.02	285		
T7 LC (5)	8.15	52.8	0.12	3.86
	8.16	50.8		
T1.1 A (>100)	3.83	77.6	5.88	2.07
	3.91	82.3		



FRX:

Para la precisión de los análisis de FRX las mediciones se determinaron por triplicado, el valor reportado es el promedio de las tres determinaciones reportando también el % del coeficiente de variación (CV) de las mediciones (menor al 20%).

Para determinar la exactitud en FRX se utilizaron estándares certificados (TILL-4 y NIST-2710) como control analítico los cuales fueron analizados como muestra para determinar su concentración las concentraciones se encontraron entre el 80 y el 113% lo cual indica un buen desempeño del método de análisis.

Estándares	%Exactitud							
	As	Ba	Cu	Cr	Fe	Mn	Pb	Zn
TILL-4	96.10	99.53	96.15	108.7	83.37	84.07	103.7	NA
NIST-2710	105.8	NA	108.23	NA	109.21	104.78	101.93	111.3

Sin mas por al momento quedo a sus ordenes.

Analista:

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M en C Atlicia Santana Silva

QA. Daniel Ramos Pérez

Víctor Guillermo Montaña Jiménez

Responsable tecnico:

M en C Luis Gerardo Martínez Jardines



INFORME DE RESULTADOS
BACANUCHI

Datos del solicitante:

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Información de las muestras

Fecha de recepción de muestras: 13 de julio del 2015

Se recibieron 228 muestras en bolsas de plástico de 25X10 cm, preservadas e identificadas adecuadamente, etiquetadas como B1 A LA B8 con diferentes profundidades y claves adjunta A, LB, LC, LE ,RB, RD, RC y RE de la zona Bacuachi.

Información de los análisis

En el laboratorio de Geoquímica Ambiental las muestras fueron homogeneizadas y tamizadas por malla N° 10 para su análisis de pH, Conductividad eléctrica y FRX.

El pH se determinó con un potenciómetro Hanna Instruments, HI-98185 y se siguió el método estandarizado 9040 C de la US-EPA .

Conductividad eléctrica (CE) determinó con un conductímetro OAKTON Con 700. y se siguió el método APHA 1992. Standard methods for the examination of water and wastewater.

Fluorescencia de rayos X. El análisis se determinó con un equipo de Fluorescencia de Rayos X, NITTON FXL 950 de Thermo Scientific y se siguió el método EPA 6200. La determinación fue realizada por triplicado con un tiempo de medición de 90s en el modo de suelo y 31 s en el modo de mina para Fe. Los elementos cuantificados en cada determinación se reportan en mg/kg (ppm) para el modo de suelo y (%) para el modo de mina.



Listado de recepción de muestras:

ID Campo	coordenadas		ID Campo	coordenadas	
	X	Y		X	Y
B1-A (0-5cm)	565688	3400681	B1-RB (0-5 cm)	565692	3400687
B1-A (25cm)	565688	3400681	B1-RB (25 cm)	565692	3400687
B1-A (50cm)	565688	3400681	B1-RB (50 cm)	565692	3400687
B1-A (100cm)	565688	3400681	B1-RB (100 cm)	565692	3400687
B1-A (150cm)	565688	3400681	B1-RB (150 cm)	565692	3400687
B1-A (200cm)	565688	3400681	B1-RB (200 cm)	565692	3400687
B1-A (250cm)	565688	3400681	B1-RB (250 cm)	565692	3400687
B1-A (300cm)	565688	3400681	B1-RB (300 cm)	565692	3400687
B1-LB (0-5cm)	565676	3400682	B1-RB (350 cm)	565692	3400687
B1-LB (25cm)	565676	3400682	B1-RC (0-5 cm)	565697	3400683
B1-LB (50cm)	565676	3400682	B1-RC (25 cm)	565697	3400683
B1-LB (100cm)	565676	3400682	B1-RC (50 cm)	565697	3400683
B1-LB (150cm)	565676	3400682	B1-RD (0-5 cm)	565710	3400691
B1-LB (200cm)	565676	3400682	B1-RD (25 cm)	565710	3400691
B1-LB (250cm)	565676	3400682	B1-RD (50 cm)	565710	3400691
B1-LB (300cm)	565676	3400682	B1-RE (0-5 cm)	565753	3400701
B1-LC (0-5cm)	565680	3400673	B1-RE (25 cm)	565753	3400701
B1-LC (25cm)	565680	3400673	B1-RE (50 cm)	565753	3400701
B1-LC (50cm)	565680	3400673	B2-A(0-5cm)	566472	3397612
B1-LC (100cm)	565680	3400673	B2-A(25cm)	566472	3397612
B1-LD (0-5cm)	565657	3400666	B2-A(40-50cm)	566472	3397612
B1-LD (25cm)	565657	3400666	B2-A(50-100cm)	566472	3397612
B1-LD (50cm)	565657	3400666	B2-A(150cm)	566472	3397612
B1-LD (80cm)	565657	3400666	B2-A(200cm)	566472	3397612
B1-LE (0-5cm)	565616	3400663	B2-A(250cm)	566472	3397612
B1-LE (25cm)	565616	3400663	B2-A(270cm)	566472	3397612
B1-LE (50cm)	565616	3400663	B2-LB(0-5cm)	566458	3397596
B1-LE (80cm)	565616	3400663	B2-LB(25cm)	566458	3397596



Laboratorio Nacional de Geoquímica y Minerología
Universidad Nacional Autónoma de México
Geoquímica Ambiental



ID Campo	coordenadas		ID Campo	coordenadas	
	X	Y		X	Y
B2-LB(50cm)	566458	3397596	B3-LB (150-200cm)	567641	3395858
B2-LB(100cm)	566458	3397596	B3-LB (200-250cm)	567641	3395858
B2-LB(150cm)	566458	3397596	B3-LB (250-300cm)	567641	3395858
B2-LB(200cm)	566458	3397596	B3-LB (>300cm)	567641	3395858
B2-LC(0-5cm)	566436	3397596	B3-LC (0-5cm)	567629	3395858
B2-LC(25cm)	566436	3397596	B3-LC (25cm)	567629	3395858
B2-LC(50cm)	566436	3397596	B3-LC (50cm)	567629	3395858
B2-LC(100cm)	566436	3397596	B3-LD (0-5cm)	567618	3395849
B2-LC(150cm)	566436	3397596	B3-LD (25cm)	567618	3395849
B2-RB(0-5cm)	566485	3397616	B3-LD (50cm)	567618	3395849
B2-RB(25cm)	566485	3397616	B3-LE (0-5cm)	567606	3395844
B2-RB(50cm)	566485	3397616	B3-LE (25cm)	567606	3395844
B2-RB(100cm)	566485	3397616	B3-LE (50cm)	567606	3395844
B2-RB(150cm)	566485	3397616	B3-RB (0-5cm)	567656	3395867
B2-RB(200cm)	566485	3397616	B3-RB (25cm)	567656	3395867
B2-RB(250cm)	566485	3397616	B3-RB (50cm)	567656	3395867
B2-RC(0-5cm)	566506	3397619	B3-RB (100cm)	567656	3395867
B2-RC(25cm)	566506	3397619	B3-RB (200cm)	567656	3395867
B2-RC(50cm)	566506	3397619	B3-RB (300cm)	567656	3395867
B2-RC(100cm)	566506	3397619	B3-RC (0-5cm)	567658	3395870
B3-A (0-5cm)	567647	3395869	B3-RC (25cm)	567658	3395870
B3-A (25cm)	567647	3395869	B3-RC (50cm)	567658	3395870
B3-A (50cm)	567647	3395869	B3-RD (0-5cm)	567614	3395871
B3-A (100cm)	567647	3395869	B3-RD (25cm)	567614	3395871
B3-A (200cm)	567647	3395869	B3-RD (50cm)	567614	3395871
B3-A (300cm)	567647	3395869	B3-RE (0-5cm)	567690	3395883
B3-LB (0-5cm)	567641	3395858	B3-RE (25cm)	567690	3395883
B3-LB (5-25cm)	567641	3395858	B3-RE (50cm)	567690	3395883
B3-LB (25-50cm)	567641	3395858	B4-A(0-5cm)	570840	3391618
B3-LB (50-100cm)	567641	3395858	B4-A(25cm)	570840	3391618
B3-LB (100-150cm)	567641	3395858	B4-A(50cm)	570840	3391618



**Laboratorio Nacional de Geoquímica y Minerología
Universidad Nacional Autónoma de México
Geoquímica Ambiental**



ID Campo	coordenadas		ID Campo	coordenadas	
	X	Y		X	Y
B4-A(55-65cm)	570840	3391618	B4-RD(50cm)	570888	3391639
B4-A(100cm)	570840	3391618	B4-RE(0-5cm)	570905	3391665
B4-A(150cm)	570840	3391618	B4-RE(25cm)	570905	3391665
B4-A(190cm)	570840	3391618	B4-RE(50cm)	570905	3391665
B4-LB(0-5cm)	570837	3391620	B5-A(0-5cm)	571534	3388308
B4-LB(20-70cm)	570837	3391620	B5-A(10cm)	571534	3388308
B4-LB(70-140cm)	570837	3391620	B5-A(25cm)	571534	3388308
B4-LB(140-190cm)	570837	3391620	B5-A(50cm)	571534	3388308
B4-LB(190-240cm)	570837	3391620	B5-A(100cm)	571534	3388308
B4-LB(240-260cm)	570837	3391620	B5-A(150cm)	571534	3388308
B4-LC(0-5cm)	570832	3391630	B5-A(200cm)	571534	3388308
B4-LC(25cm)	570832	3391630	B5-A(>300cm)	571534	3388308
B4-LC(50cm)	570832	3391630	B5-LB (0-10cm)	571512	3388316
B4-LC(100cm)	570832	3391630	B5-LB (10cm)	571512	3388316
B4-LD(0-5cm)	570769	3391604	B5-LB (25cm)	571512	3388316
B4-LD(25cm)	570769	3391604	B5-LB (50cm)	571512	3388316
B4-LD(50cm)	570769	3391604	B5-LB (100cm)	571512	3388316
B4-LE(0-5cm)	570663	3391542	B5-LB (150cm)	571512	3388316
B4-LE(25cm)	570663	3391542	B5-LB (200cm)	571512	3388316
B4-LE(50cm)	570663	3391542	B5-LB (300cm)	571512	3388316
B4-RB(0-5cm)	570845	3391625	B5-LB (350cm)	571512	3388316
B4-RB(25cm)	570845	3391625	B5-LC (5cm)	571494	3388317
B4-RB(50cm)	570845	3391625	B5-LC (25cm)	571494	3388317
B4-RB(100cm)	570845	3391625	B5-LC (50cm)	571494	3388317
B4-RB(150cm)	570845	3391625	B5-LD (5cm)	571427	3388322
B4-RC(0-5cm)	570859	3391622	B5-LD (25cm)	571427	3388322
B4-RC(25cm)	570859	3391622	B5-LD (50cm)	571427	3388322
B4-RC(50cm)	570859	3391622	B5-RB(0-5 cm)	571546	3388297
B4-RC(100cm)	570859	3391622	B5-RB(25cm)	571546	3388297
B4-RD(0-5cm)	570888	3391639	B5-RB(50cm)	571546	3388297
B4-RD(25cm)	570888	3391639	B5-RB(100cm)	571546	3388297



ID Campo	coordenadas		ID Campo	coordenadas	
	X	Y		X	Y
B5-RB(200cm)	571546	3388297	B7-A (0-5cm)	579555	3377102
B5-RB(300cm)	571546	3388297	B7-LB (0-5cm)	579563	3376890
B5-RC(0-5cm)	571551	3388285	B7-LC (0-5cm)	579547	3376894
B5-RC(25cm)	571551	3388285	B7-LC (25cm)	579547	3376894
B5-RC(50cm)	571551	3388285	B7-LC (50cm)	579547	3376894
B5-RD(0-5cm)	571675	3388301	B7-LC (100cm)	579547	3376894
B5-RD(25cm)	571675	3388301	B7-LD (0-5cm)	579472	3376877
B5-RD(50cm)	571675	3388301	B7-LD (30cm)	579472	3376877
B5-RD'(0-5cm)	571600	3388302	B7-RB (0-5cm)	579563	3376890
B5-RD'(25cm)	571600	3388302	B7-RC (0-5cm)	579569	3376887
B5-RD'(50cm)	571600	3388302	B7-RC (25cm)	579569	3376887
B6-A(0-5cm)	573192	3384461	B7-RC (50cm)	579569	3376887
B6-LB	573184	3384456	B8-A (0-5cm)	581288	3368504
B6-RB	573150	3384464	B8-LB (0-5cm)	581282	3368512
B6-RC(0-5cm)	573206	3384475	B8-LC (0-5cm)	581285	3368511
B6-RC(5-30cm)	573206	3384475	B8-LC (5-25cm)	581285	3368511
B6-RC(30-60cm)	573206	3384475	B8-LC (25-50cm)	581285	3368511
B6-RC(60-80cm)	573206	3384475	B8-LC (50-75cm)	581285	3368511
B6-RC(80-110cm)	573206	3384475	B8-LC (+75cm)	581285	3368511
B6-LC(0-5cm)	573182	3384455	B8-RB (0-5cm)	581289	3368506
B6-LC(5-30cm)	573182	3384455	B8-RC (0-5cm)	581295	3368504
B6-LC(30-60cm)	573182	3384455	B8-RC (5-25cm)	581295	3368504
B6-LC(60-85cm)	573122	3384455	B8-RC (25-50cm)	581295	3368504
B6-LC(85-100cm)	573122	3384455	B8-RC (+50cm)	581295	3368504

Resultados de pH y CE:

ID Campo	pH	CE (us/cm)	ID Campo	pH	CE (us/cm)
B1-A (0-5cm)	8.16	34.6	B1-A (150cm)	7.77	45.7
B1-A (25cm)	8.08	42.5	B1-A (200cm)	7.65	28.5
B1-A (50cm)	8.11	40.9	B1-A (250cm)	7.38	32
B1-A (100cm)	7.91	32.5	B1-A (300cm)	7.47	27.4



Laboratorio Nacional de Geoquímica y Minerología
Universidad Nacional Autónoma de México
Geoquímica Ambiental



ID Campo	pH	CE (us/cm)	ID Campo	pH	CE (us/cm)
B1-LB (150cm)	6.91	66.5	B1-RE (0-5 cm)	8.61	75.6
B1-LB (200cm)	8.19	64.8	B1-RE (25 cm)	7.23	71.6
B1-LB (250cm)	8.11	98.3	B1-RE (50 cm)	6.05	246
B1-LB (300cm)	8.45	75.7	B2-A(0-5cm)	8.1	27.1
B1-LC (0-5cm)	7.9	105.6	B2-A(25cm)	7.69	41.7
B1-LC (25cm)	8.25	68.4	B2-A(40-50cm)	5.63	224
B1-LC (50cm)	8.58	79.2	B2-A(50-100cm)	5.17	146
B1-LC (100cm)	8.88	66.9	B2-A(150cm)	6.5	167.6
B1-LD (0-5cm)	8.65	38.4	B2-A(200cm)	8.03	63.8
B1-LD (25cm)	8.45	51	B2-A(250cm)	8.51	63.9
B1-LD (50cm)	8.53	48	B2-A(270cm)	8.55	73.6
B1-LD (80cm)	8.54	55.8	B2-LB(0-5cm)	8.06	20.1
B1-LE (0-5cm)	7.96	62.3	B2-LB(25cm)	7.83	24.2
B1-LE (25cm)	8.13	123.8	B2-LB(50cm)	8.04	35.7
B1-LE (50cm)	8.1	70.2	B2-LB(100cm)	8.06	20.6
B1-LE (80cm)	8.2	63.1	B2-LB(150cm)	7.92	30.6
B1-RB (0-5 cm)	7.85	38.3	B2-LB(200cm)	8.04	26.7
B1-RB (25 cm)	7.7	27.5	B2-LC(0-5cm)	7.72	71.3
B1-RB (50 cm)	7.61	34.6	B2-LC(25cm)	7.06	198.9
B1-RB (100 cm)	7.41	27.7	B2-LC(50cm)	7.22	111.3
B1-RB (150 cm)	7.45	24.9	B2-LC(100cm)	6.86	116.4
B1-RB (200 cm)	7.5	57.2	B2-LC(150cm)	8.01	126.8
B1-RB (250 cm)	7.77	37.5	B2-RB(0-5cm)	8.04	31.4
B1-RB (300 cm)	7.89	37.6	B2-RB(25cm)	7.64	28.7
B1-RB (350 cm)	8.16	42.5	B2-RB(50cm)	8.52	42.3
B1-RC (0-5 cm)	7.03	93.2	B2-RB(100cm)	8.7	49
B1-RC (25 cm)	7.5	43.2	B2-RB(150cm)	7.91	38.7
B1-RC (50 cm)	8.11	50.1	B2-RB(200cm)	8.61	59
B1-RD (0-5 cm)	7.9	56.1	B2-RB(250cm)	8.76	69
B1-RD (25 cm)	7.78	53.1	B2-RC(0-5cm)	8.09	24.7
B1-RD (50 cm)	7.36	143.4	B2-RC(25cm)	8.08	18.69



Laboratorio Nacional de Geoquímica y Minerología
Universidad Nacional Autónoma de México
Geoquímica Ambiental



ID Campo	pH	CE (us/cm)	ID Campo	pH	CE (us/cm)
B2-RC(50cm)	7.7	27.8	B3-RB (300cm)	7.96	50.6
B2-RC(100cm)	7.91	36.2	B3-RC (0-5cm)	8.35	37.2
B3-A (0-5cm)	8.05	34.30	B3-RC (25cm)	7.98	28.4
B3-A (25cm)	7.7	21.2	B3-RC (50cm)	7.93	42.4
B3-A (50cm)	7.82	20.3	B3-RD (0-5cm)	8.53	89.9
B3-A (100cm)	7.82	23.6	B3-RD (25cm)	8.48	92.20
B3-A (200cm)	7.73	35.7	B3-RD (50cm)	8.4	113.8
B3-A (300cm)	7.78	20.2	B3-RE (0-5cm)	9	62
B3-LB (0-5cm)	8.18	28.1	B3-RE (25cm)	8.71	106.1
B3-LB (5-25cm)	8.56	45.1	B3-RE (50cm)	9.1	47.6
B3-LB (25-50cm)	8.3	26.5	B4-A(0-5cm)	8.12	58.9
B3-LB (50-100cm)	8.27	24.2	B4-A(25cm)	7.88	30.6
B3-LB (100-150cm)	7.92	16.26	B4-A(50cm)	7.66	26
B3-LB (150-200cm)	7.93	25.4	B4-A(55-65cm)	7.55	44.6
B3-LB (200-250cm)	8.79	29.6	B4-A(100cm)	7.57	28
B3-LB (250-300cm)	8.64	31.7	B4-A(150cm)	7.58	27
B3-LB (>300cm)	8.51	36.5	B4-A(190cm)	7.52	14.8
B3-LC (0-5cm)	8.58	44.8	B4-LB(0-5cm)	7.38	68.8
B3-LC (25cm)	8.08	55.3	B4-LB(20-70cm)	7.86	43.7
B3-LC (50cm)	7.3	35.5	B4-LB(70-140cm)	8.24	50.5
B3-LD (0-5cm)	8.49	44.5	B4-LB(140-190cm)	7.93	34.8
B3-LD (25cm)	8.43	60.1	B4-LB(190-240cm)	7.56	37.3
B3-LD (50cm)	8.35	37.7	B4-LB(240-260cm)	7.28	47.6
B3-LE (0-5cm)	8.61	62.6	B4-LC(0-5cm)	7.41	51
B3-LE (25cm)	8.64	56.5	B4-LC(25cm)	7.65	39.1
B3-LE (50cm)	8.57	41.9	B4-LC(50cm)	7.98	53.2
B3-RB (0-5cm)	8.74	32.7	B4-LC(100cm)	7.86	43
B3-RB (25cm)	8.41	22.7	B4-LD(0-5cm)	7.8	27.1
B3-RB (50cm)	8.21	32.4	B4-LD(25cm)	7.8	59.5
B3-RB (100cm)	8.49	45.4	B4-LD(50cm)	7.85	60.1
B3-RB (200cm)	7.91	40	B4-LE(0-5cm)	6.29	162.85



**Laboratorio Nacional de Geoquímica y Minerología
Universidad Nacional Autónoma de México
Geoquímica Ambiental**



ID Campo	pH	CE (us/cm)	ID Campo	pH	CE (us/cm)
B4-LE(25cm)	7.99	165	B5-LB (200cm)	8.8	36.9
B4-LE(50cm)	8.16	90.9	B5-LB (300cm)	8.19	36.1
B4-RB(0-5cm)	8.21	47.5	B5-LB (350cm)	8.3	57.2
B4-RB(25cm)	8.11	33	B5-LC (5cm)	7.92	99.4
B4-RB(50cm)	7.83	32.3	B5-LC (25cm)	8.29	55.35
B4-RB(100cm)	7.56	38.5	B5-LC (50cm)	8.08	74.9
B4-RB(150cm)	7.68	21.4	B5-LD (5cm)	8.23	56.2
B4-RC(0-5cm)	7.61	45.6	B5-LD (25cm)	8.33	39.55
B4-RC(25cm)	7.8	38.8	B5-LD (50cm)	7.54	373
B4-RC(50cm)	7.59	44.6	B5-RB(0-5 cm)	7.34	46.4
B4-RC(100cm)	7.4	31.6	B5-RB(25cm)	6.34	432
B4-RD(0-5cm)	7.98	53.11	B5-RB(50cm)	8.57	43.8
B4-RD(25cm)	8.27	70.7	B5-RB(100cm)	8.16	32.6
B4-RD(50cm)	8.45	85	B5-RB(200cm)	8.58	71.5
B4-RE(0-5cm)	7.76	178	B5-RB(300cm)	8.6	88.4
B4-RE(25cm)	7.81	75.1	B5-RC(0-5cm)	7.86	604
B4-RE(50cm)	7.51	99.7	B5-RC(25cm)	8.31	377
B5-A(0-5cm)	9.18	55.6	B5-RC(50cm)	8.29	188.2
B5-A(10cm)	9.18	41.8	B5-RD(0-5cm)	8.15	69.3
B5-A(25cm)	9.07	47.6	B5-RD(25cm)	7.82	181
B5-A(50cm)	9.05	48.7	B5-RD(50cm)	8.37	115.2
B5-A(100cm)	9.22	33.2	B5-RD'(0-5cm)	7.91	43.5
B5-A(150cm)	9.26	27.5	B5-RD'(25cm)	7.72	139.90
B5-A(200cm)	9.31	41.5	B5-RD'(50cm)	8.18	87.3
B5-A(>300cm)	9.16	54	B6-A(0-5cm)	8.55	54.75
B5-LB (0-10cm)	8.27	57.2	B6-LB	8.21	51.1
B5-LB (10cm)	6.86	50.3	B6-RB	8.34	47.6
B5-LB (25cm)	8.18	37.9	B6-RC(0-5cm)	8.74	53.6
B5-LB (50cm)	8.19	37.3	B6-RC(5-30cm)	8.11	33.7
B5-LB (100cm)	8.57	49.1	B6-RC(30-60cm)	8.7	153.2
B5-LB (150cm)	8.3	42.6	B6-RC(60-80cm)	8.51	210



**Laboratorio Nacional de Geoquímica y Minerología
Universidad Nacional Autónoma de México
Geoquímica Ambiental**



ID Campo	pH	CE (us/cm)	ID Campo	pH	CE (us/cm)
B6-RC(80-110cm)	8.68	163.1	B7-RC (0-5cm)	8.4	220
B6-LC(0-5cm)	8.24	149.5	B7-RC (25cm)	8.35	375.00
B6-LC(5-30cm)	8.11	423	B7-RC (50cm)	8.21	595
B6-LC(30-60cm)	9.17	207	B8-A (0-5cm)	8.57	70.4
B6-LC(60-85cm)	8.25	305	B8-LB (0-5cm)	8.84	92.7
B6-LC(85-100cm)	7.97	68.7	B8-LC (0-5cm)	7.96	93.8
B7-A (0-5cm)	9.23	59.7	B8-LC (5-25cm)	8.12	73.8
B7-LB (0-5cm)	8.99	59.3	B8-LC (25-50cm)	8.76	90.3
B7-LC (0-5cm)	8.88	55.5	B8-LC (50-75cm)	8.5	114.9
B7-LC (25cm)	8.19	61.5	B8-LC (+75cm)	8.55	251
B7-LC (50cm)	8.72	56.5	B8-RB (0-5cm)	8.83	93.2
B7-LC (100cm)	8.19	216	B8-RC (0-5cm)	8.4	82.3
B7-LD (0-5cm)	7.51	68.7	B8-RC (5-25cm)	8.45	66.8
B7-LD (30cm)	7.54	420	B8-RC (25-50cm)	8.51	65.3
B7-RB (0-5cm)	8.92	71.3	B8-RC (+50cm)	8.75	63.5

Resultados de FRX :

ID Campo	As		Ba		Cr		Cu	
	mg/Kg	% CV	mg/Kg	% CV	mg/Kg	% CV	mg/Kg	% CV
LD	5.00		30.00		10.00		9.00	
B1-A (0-5cm)	24.23	6.82	672.44	2.04	156.38	3.99	152.44	2.52
B1-A (25cm)	29.71	1.55	724.29	2.40	149.12	1.13	161.24	2.90
B1-A (50cm)	26.94	1.79	725.33	2.96	155.49	3.38	146.25	0.72
B1-A (100cm)	30.31	3.58	718.34	1.90	155.95	1.72	213.76	2.40
B1-A (150cm)	25.55	1.60	641.94	2.47	137.57	11.12	132.49	3.14
B1-A (200cm)	23.13	5.28	832.26	1.68	128.55	2.06	80.02	2.96
B1-A (250cm)	23.89	1.85	689.87	1.81	149.43	2.01	106.93	3.28
B1-A (300cm)	21.42	5.51	660.65	2.57	180.88	3.03	55.77	2.43

NA= No aplica

<LOD= Debajo del límite de detección.



Laboratorio Nacional de Geoquímica y Minerología
Universidad Nacional Autónoma de México
Geoquímica Ambiental



ID Campo	Fe		Mn		Pb		Zn	
	%	% CV	mg/Kg	% CV	mg/Kg	% CV	mg/Kg	% CV
LD	0.10		40.00		6.00		7.00	
B1-A (0-5cm)	2.78	0.51	704.24	2.77	54.22	2.07	107.79	2.23
B1-A (25cm)	2.40	0.35	646.06	0.82	49.87	3.29	112.47	2.74
B1-A (50cm)	2.18	0.23	619.98	2.20	48.41	3.17	109.96	3.49
B1-A (100cm)	2.54	0.58	749.55	2.72	65.12	1.03	113.29	4.52
B1-A (150cm)	2.83	0.16	995.43	0.36	50.92	3.04	147.05	0.66
B1-A (200cm)	2.26	0.31	645.50	1.41	37.60	6.29	86.26	3.70
B1-A (250cm)	2.26	0.36	581.29	1.54	36.22	2.94	89.98	1.77
B1-A (300cm)	2.23	0.70	587.53	1.66	40.25	3.60	84.05	3.51

ID Campo	As		Ba		Cr		Cu	
	mg/Kg	% CV	mg/Kg	% CV	mg/Kg	% CV	mg/Kg	% CV
LD	5.00		30.00		10.00		9.00	
B1-LB (0-5cm)	26.00	4.78	792.89	2.35	125.88	6.43	164.95	2.33
B1-LB (25cm)	39.07	0.86	670.81	0.39	125.10	9.28	218.39	1.48
B1-LB (50cm)	34.01	3.82	798.96	3.46	129.96	5.56	135.15	1.53
B1-LB (100cm)	26.63	7.40	797.70	4.01	118.49	2.07	257.78	2.80
B1-LB (150cm)	25.49	6.13	703.91	1.30	133.86	2.16	220.66	0.85
B1-LB (200cm)	24.23	4.65	798.49	0.93	122.71	1.88	103.01	3.77
B1-LB (250cm)	24.99	1.27	858.21	1.49	146.61	2.57	79.93	4.76
B1-LB (300cm)	24.06	8.43	865.70	1.59	140.47	4.05	66.10	2.10
B1-LC (0-5cm)	34.21	2.56	633.54	3.71	119.41	4.19	159.54	4.36
B1-LC (25cm)	28.81	12.07	705.38	1.95	90.36	5.29	132.82	5.14
B1-LC (50cm)	30.42	8.05	684.83	2.27	101.67	2.27	110.77	1.05
B1-LC (100cm)	28.07	2.85	649.08	2.14	89.97	4.20	114.07	4.01
B1-LD (0-5cm)	24.44	3.41	795.37	1.78	86.68	2.51	117.05	3.94
B1-LD (25cm)	26.61	10.26	674.37	3.64	92.32	7.69	107.10	1.18
B1-LD (50cm)	28.42	6.50	615.67	3.97	98.65	3.36	135.64	1.97
B1-LD (80cm)	27.53	8.58	772.55	3.41	85.63	1.75	206.51	1.41
B1-LE (0-5cm)	28.96	5.58	573.02	3.45	143.27	6.11	113.28	3.17
B1-LE (25cm)	30.66	3.16	589.32	1.11	112.71	1.74	108.80	1.11
B1-LE (50cm)	26.67	2.92	585.57	1.29	147.78	5.88	96.91	3.84
B1-LE (80cm)	31.36	4.08	620.61	2.51	155.68	2.68	149.02	2.61



Laboratorio Nacional de Geoquímica y Minerología
Universidad Nacional Autónoma de México
Geoquímica Ambiental



ID Campo	Fe		Mn		Pb		Zn	
	%	% CV	mg/Kg	% CV	mg/Kg	% CV	mg/Kg	% CV
LD	0.10		40.00		6.00		7.00	
B1-LB (0-5cm)	2.34	0.32	668.96	3.88	47.98	1.86	120.33	1.15
B1-LB (25cm)	3.07	0.26	553.18	3.32	50.59	5.41	109.74	3.41
B1-LB (50cm)	2.85	0.12	864.17	2.22	57.82	3.17	107.99	6.96
B1-LB (100cm)	2.42	0.06	786.28	2.70	46.40	0.59	122.43	0.99
B1-LB (150cm)	2.43	0.55	984.24	3.32	53.05	2.30	124.33	2.10
B1-LB (200cm)	2.45	0.28	801.00	2.60	40.67	2.57	127.05	0.45
B1-LB (250cm)	3.13	0.44	1007.34	0.86	44.65	6.23	108.25	1.09
B1-LB (300cm)	2.78	0.22	702.33	2.22	33.00	3.22	77.64	1.55
B1-LC (0-5cm)	4.41	0.14	977.41	3.45	75.41	3.09	132.39	3.19
B1-LC (25cm)	3.35	0.11	845.77	1.05	65.64	2.01	121.07	3.04
B1-LC (50cm)	3.22	0.17	863.02	5.47	57.28	5.89	118.74	9.90
B1-LC (100cm)	3.10	0.17	897.15	0.96	64.80	3.84	117.98	2.73
B1-LD (0-5cm)	2.87	0.56	793.78	2.74	61.85	0.47	111.22	0.82
B1-LD (25cm)	3.33	0.65	852.72	0.67	63.76	3.70	115.70	3.00
B1-LD (50cm)	3.49	0.29	952.26	1.76	61.62	2.12	126.20	3.13
B1-LD (80cm)	3.34	0.36	853.90	1.74	64.74	5.61	120.32	1.01
B1-LE (0-5cm)	3.03	0.47	783.05	1.59	65.98	2.11	121.30	2.41
B1-LE (25cm)	2.94	0.36	898.43	2.59	69.79	2.28	129.79	2.88
B1-LE (50cm)	2.66	0.41	803.27	0.48	62.11	4.22	98.98	0.57
B1-LE (80cm)	2.94	0.36	960.35	3.84	62.67	1.64	109.67	2.65

ID Campo	As		Ba		Cr		Cu	
	mg/Kg	% CV	mg/Kg	% CV	mg/Kg	% CV	mg/Kg	% CV
LD	5.00		30.00		10.00		9.00	
B1-RB (0-5 cm)	33.37	4.91	748.50	1.65	161.02	5.71	169.43	1.52
B1-RB (25 cm)	28.43	8.14	798.15	1.53	147.16	1.51	170.22	1.67
B1-RB (50 cm)	26.03	3.82	728.32	1.16	147.03	4.96	120.54	4.03
B1-RB (100 cm)	30.28	4.51	706.21	3.46	167.63	3.98	127.13	1.44
B1-RB (150 cm)	31.88	3.56	798.66	2.32	147.49	3.36	149.80	1.33
B1-RB (200 cm)	34.54	8.47	692.04	0.59	157.93	3.19	217.41	1.79
B1-RB (250 cm)	24.80	6.73	742.25	1.00	146.40	1.30	288.61	1.95
B1-RB (300 cm)	25.98	1.51	747.71	0.85	161.38	2.92	59.26	4.47
B1-RB (350 cm)	21.80	4.46	707.56	0.83	161.33	1.13	50.72	6.98



Laboratorio Nacional de Geoquímica y Minerología
Universidad Nacional Autónoma de México
Geoquímica Ambiental



ID Campo	Fe		Mn		Pb		Zn	
	%	% CV	mg/Kg	% CV	mg/Kg	% CV	mg/Kg	% CV
LD	0.10		40.00		6.00		7.00	
B1-RB (0-5 cm)	3.59	0.16	1166.57	1.30	58.47	1.42	126.66	1.09
B1-RB (25 cm)	2.30	0.15	785.79	2.00	58.83	3.58	117.96	1.66
B1-RB (50 cm)	2.51	0.11	948.09	2.23	54.57	3.10	99.90	1.68
B1-RB (100 cm)	3.02	0.33	718.59	2.51	56.87	0.38	98.54	2.13
B1-RB (150 cm)	2.49	0.27	691.46	0.48	53.64	3.06	109.76	3.00
B1-RB (200 cm)	2.88	0.58	876.83	2.71	67.56	5.55	130.66	2.48
B1-RB (250 cm)	2.55	0.23	826.09	1.14	39.55	6.28	117.89	3.32
B1-RB (300 cm)	2.69	0.23	700.60	0.45	50.28	1.41	101.72	2.96
B1-RB (350 cm)	2.14	0.49	534.43	3.03	37.25	0.66	79.65	2.94

ID Campo	As		Ba		Cr		Cu	
	mg/Kg	% CV	mg/Kg	% CV	mg/Kg	% CV	mg/Kg	% CV
LD	5.00		30.00		10.00		9.00	
B1-RC (0-5 cm)	29.98	9.03	646.92	2.85	143.22	4.41	117.41	3.21
B1-RC (25 cm)	29.00	5.42	644.50	2.00	159.71	3.54	170.00	3.35
B1-RC (50 cm)	26.37	8.52	690.56	1.42	136.47	9.09	129.02	3.62
B1-RD (0-5 cm)	28.86	14.72	713.68	1.06	149.87	1.52	99.09	5.60
B1-RD (25 cm)	30.88	5.22	621.26	2.04	147.26	4.34	118.05	6.03
B1-RD (50 cm)	30.56	4.77	570.76	1.35	123.57	3.15	108.14	1.47
B1-RE (0-5 cm)	28.57	3.20	585.91	3.51	137.44	3.84	104.09	7.32
B1-RE (25 cm)	32.91	3.36	530.97	0.46	127.68	4.01	90.42	3.90
B1-RE (50 cm)	31.89	6.46	505.32	3.82	123.04	5.34	107.39	6.04
B2-A(0-5cm)	24.91	4.89	810.81	0.81	112.26	4.11	167.36	3.65
B2-A(25cm)	32.47	6.35	757.20	0.58	132.75	1.52	118.26	5.41
B2-A(40-50cm)	63.57	0.76	721.70	3.47	151.42	4.31	149.69	1.06
B2-A(50-100cm)	43.27	5.10	860.11	0.72	151.24	3.12	140.47	0.50
B2-A(150cm)	19.84	6.60	629.39	1.42	141.69	3.21	107.08	1.43
B2-A(200cm)	25.78	8.18	357.38	3.05	146.12	4.90	90.91	4.11
B2-A(250cm)	24.38	12.35	660.37	1.96	143.58	3.74	75.45	2.85
B2-A(270cm)	28.06	7.26	520.05	2.12	143.72	7.54	76.94	2.87



Laboratorio Nacional de Geoquímica y Minerología
Universidad Nacional Autónoma de México
Geoquímica Ambiental



ID Campo	Fe		Mn		Pb		Zn	
	%	% CV	mg/Kg	% CV	mg/Kg	% CV	mg/Kg	% CV
LD	0.10		40.00		6.00		7.00	
B1-RC (0-5 cm)	3.04	0.23	913.22	2.78	71.42	6.41	120.89	1.56
B1-RC (25 cm)	3.19	0.32	806.50	1.01	67.54	1.87	115.41	1.37
B1-RC (50 cm)	3.03	0.31	935.95	2.17	70.40	3.26	119.74	3.01
B1-RD (0-5 cm)	31.67	0.40	787.14	2.32	66.75	7.88	105.76	4.81
B1-RD (25 cm)	29.16	0.49	898.66	2.15	65.68	2.09	116.41	1.84
B1-RD (50 cm)	2.83	0.51	962.03	1.42	71.93	0.75	135.12	2.76
B1-RE (0-5 cm)	2.94	0.28	1006.43	1.95	80.14	4.44	143.45	0.44
B1-RE (25 cm)	2.85	0.18	1035.79	1.79	75.16	1.44	146.92	0.93
B1-RE (50 cm)	2.87	0.15	1026.27	0.98	86.54	0.81	147.12	2.41
B2-A(0-5cm)	2.56	0.14	775.29	1.21	60.08	0.56	112.11	1.39
B2-A(25cm)	2.22	0.57	524.93	3.58	45.06	3.45	93.12	3.97
B2-A(40-50cm)	3.63	0.14	483.55	4.78	68.27	3.11	104.43	2.08
B2-A(50-100cm)	2.72	0.29	511.88	2.84	41.71	5.86	85.48	2.39
B2-A(150cm)	3.20	0.50	1285.72	2.35	64.00	3.33	176.22	1.11
B2-A(200cm)	3.36	0.27	1021.86	1.07	66.92	3.69	151.80	1.87
B2-A(250cm)	3.12	0.26	968.14	2.80	56.24	3.32	114.64	1.40
B2-A(270cm)	3.14	0.65	1090.55	2.10	55.81	4.67	123.74	3.29

ID Campo	As		Ba		Cr		Cu	
	mg/Kg	% CV	mg/Kg	% CV	mg/Kg	% CV	mg/Kg	% CV
LD	5.00		30.00		10.00		9.00	
B2-LB(0-5cm)	26.09	10.62	718.27	1.93	122.70	7.68	136.48	4.23
B2-LB(25cm)	29.49	1.43	757.24	0.63	126.01	3.38	129.06	3.83
B2-LB(50cm)	25.99	4.36	702.74	0.55	133.01	0.48	124.39	2.80
B2-LB(100cm)	22.62	6.90	822.52	1.06	146.34	3.99	87.77	3.63
B2-LB(150cm)	22.04	9.02	788.35	2.41	133.89	3.00	88.77	1.62
B2-LB(200cm)	19.35	2.60	772.56	1.45	121.40	5.38	69.09	1.92
B2-LC(0-5cm)	34.94	4.45	368.61	2.47	144.14	3.96	134.30	2.26
B2-LC(25cm)	21.47	11.95	339.55	3.83	126.10	4.71	89.13	3.59
B2-LC(50cm)	23.91	5.06	440.53	3.07	134.96	5.10	78.97	5.21
B2-LC(100cm)	19.13	7.27	363.79	2.93	151.88	3.50	69.62	4.45
B2-LC(150cm)	16.99	2.41	713.22	0.86	141.79	4.43	53.82	1.88



Laboratorio Nacional de Geoquímica y Minerología
Universidad Nacional Autónoma de México
Geoquímica Ambiental



ID Campo	Fe		Mn		Pb		Zn	
	%	% CV	mg/Kg	% CV	mg/Kg	% CV	mg/Kg	% CV
LD	0.10		40.00		6.00		7.00	
B2-LB(0-5cm)	2.26	0.24	588.46	4.40	46.18	10.16	89.23	4.73
B2-LB(25cm)	2.74	0.14	1364.59	2.30	57.21	1.25	102.81	4.86
B2-LB(50cm)	2.65	0.27	750.80	0.68	52.81	3.33	101.52	1.59
B2-LB(100cm)	2.43	0.33	630.05	2.80	45.66	2.07	84.65	5.08
B2-LB(150cm)	2.91	0.32	759.59	3.09	40.32	5.79	82.63	2.40
B2-LB(200cm)	2.38	0.26	622.97	4.71	41.92	1.22	80.21	5.76
B2-LC(0-5cm)	3.43	0.50	1282.05	0.43	96.29	1.76	207.85	1.73
B2-LC(25cm)	2.90	0.52	1042.62	2.89	82.71	3.38	158.05	3.30
B2-LC(50cm)	3.06	0.18	963.94	2.89	62.26	3.73	138.47	3.61
B2-LC(100cm)	2.97	0.23	990.24	2.20	52.28	2.03	120.17	2.36
B2-LC(150cm)	2.78	0.18	678.20	8.29	30.45	5.53	75.01	3.64

ID Campo	As		Ba		Cr		Cu	
	mg/Kg	% CV	mg/Kg	% CV	mg/Kg	% CV	mg/Kg	% CV
LD	5.00		30.00		10.00		9.00	
B2-RB(0-5cm)	26.52	5.41	801.67	1.61	132.02	3.48	129.00	6.99
B2-RB(25cm)	17.63	4.01	820.94	2.16	133.99	3.91	137.05	4.98
B2-RB(50cm)	20.31	4.57	729.14	0.37	180.98	3.78	61.97	4.89
B2-RB(100cm)	16.88	15.93	743.26	1.62	143.09	7.76	59.86	8.26
B2-RB(150cm)	26.95	2.89	529.12	2.66	137.17	1.55	87.28	3.30
B2-RB(200cm)	26.34	11.26	679.63	2.57	138.23	3.26	77.73	7.57
B2-RB(250cm)	24.41	2.99	692.15	1.35	141.86	2.36	74.53	1.50
B2-RC(0-5cm)	27.32	5.20	799.70	1.52	141.19	0.41	229.13	3.70
B2-RC(25cm)	32.37	4.89	687.24	1.38	141.56	3.49	261.38	0.40
B2-RC(50cm)	30.08	3.02	805.04	0.96	136.62	2.36	226.75	1.09
B2-RC(100cm)	29.92	5.08	674.17	3.29	135.97	4.95	173.36	3.57
B3-A (0-5cm)	19.75	6.88	825.68	3.11	88.59	4.97	122.50	2.72
B3-A (25cm)	19.70	7.87	812.36	2.32	77.47	10.20	87.84	3.87
B3-A (50cm)	21.14	11.57	828.51	3.21	87.66	4.17	122.45	3.29
B3-A (100cm)	24.47	8.42	729.72	2.59	107.95	2.61	125.34	4.55
B3-A (200cm)	21.42	5.77	855.39	2.62	88.51	1.24	103.81	0.44
B3-A (300cm)	21.12	7.91	744.77	3.55	93.09	1.41	88.79	3.08



Laboratorio Nacional de Geoquímica y Minerología
Universidad Nacional Autónoma de México
Geoquímica Ambiental



ID Campo	Fe		Mn		Pb		Zn	
	%	% CV	mg/Kg	% CV	mg/Kg	% CV	mg/Kg	% CV
LD	0.10		40.00		6.00		7.00	
B2-RB(0-5cm)	3.27	0.19	790.31	2.11	52.34	0.68	110.38	2.42
B2-RB(25cm)	2.44	0.18	684.24	3.60	62.39	1.67	92.87	2.62
B2-RB(50cm)	3.20	0.44	734.48	1.46	32.99	0.60	74.31	4.06
B2-RB(100cm)	2.89	0.27	834.83	2.70	39.51	6.21	88.29	2.19
B2-RB(150cm)	3.12	0.25	1146.67	0.02	68.76	3.04	143.36	1.23
B2-RB(200cm)	3.12	0.32	895.65	0.44	56.82	2.24	125.70	6.35
B2-RB(250cm)	2.86	0.64	945.97	1.95	55.63	5.01	119.37	2.22
B2-RC(0-5cm)	3.02	0.41	840.14	1.54	55.13	1.47	110.55	1.02
B2-RC(25cm)	3.26	0.35	838.09	1.99	57.42	2.41	111.81	2.98
B2-RC(50cm)	3.04	0.51	853.70	2.62	50.06	3.94	104.41	1.73
B2-RC(100cm)	3.14	0.29	903.29	1.18	61.34	4.21	108.34	2.39
B3-A (0-5cm)	2.74	0.31	625.60	3.91	41.29	2.12	91.27	4.50
B3-A (25cm)	2.70	0.10	534.41	4.83	26.57	3.60	77.81	1.34
B3-A (50cm)	2.53	0.20	644.59	1.94	41.26	4.95	96.23	2.05
B3-A (100cm)	2.74	0.34	552.00	3.70	34.08	5.22	92.89	3.32
B3-A (200cm)	2.32	0.57	535.47	1.31	36.20	2.28	84.04	2.79
B3-A (300cm)	3.11	0.32	683.33	2.28	39.06	2.93	102.45	2.69

ID Campo	As		Ba		Cr		Cu	
	mg/Kg	% CV	mg/Kg	% CV	mg/Kg	% CV	mg/Kg	% CV
LD	5.00		30.00		10.00		9.00	
B3-LB (0-5cm)	18.61	13.92	740.73	3.42	85.62	2.85	85.32	2.36
B3-LB (5-25cm)	21.30	11.66	750.97	3.80	85.30	6.54	73.25	0.97
B3-LB (25-50cm)	18.85	7.07	825.92	4.24	84.89	2.85	102.07	2.25
B3-LB (50-100cm)	15.73	5.97	625.53	3.74	81.87	6.34	61.60	1.47
B3-LB (100-150cm)	17.32	7.70	707.50	2.77	90.28	2.89	99.73	2.82
B3-LB (150-200cm)	19.47	3.24	805.31	0.99	88.28	5.77	78.28	7.73
B3-LB (200-250cm)	21.64	6.68	805.54	1.29	88.55	2.44	76.99	4.43
B3-LB (250-300cm)	22.62	3.21	835.83	2.43	88.10	5.15	83.12	3.26
B3-LB (>300cm)	19.22	8.25	788.75	1.22	86.84	5.22	85.58	2.10

NA= No aplica

<LOD= Debajo del límite de detección.



Laboratorio Nacional de Geoquímica y Minerología
Universidad Nacional Autónoma de México
Geoquímica Ambiental



ID Campo	Fe		Mn		Pb		Zn	
	%	% CV	mg/Kg	% CV	mg/Kg	% CV	mg/Kg	% CV
LD	0.10		40.00		6.00		7.00	
B3-LB (0-5cm)	3.05	0.22	536.36	3.32	30.52	4.34	82.36	4.14
B3-LB (5-25cm)	2.60	0.46	558.53	2.68	26.37	13.47	74.26	1.25
B3-LB (25-50cm)	2.57	0.97	577.92	1.99	31.17	6.03	82.47	5.44
B3-LB (50-100cm)	2.64	0.26	562.36	1.74	28.41	4.24	70.17	1.86
B3-LB (100-150cm)	2.49	0.29	488.53	6.31	31.75	8.84	81.14	2.02
B3-LB (150-200cm)	2.51	0.08	643.19	3.62	32.91	5.34	76.34	4.68
B3-LB (200-250cm)	2.48	0.13	526.57	0.51	23.90	4.61	79.00	4.17
B3-LB (250-300cm)	3.06	0.32	696.98	5.81	36.41	1.24	97.55	5.23
B3-LB (>300cm)	3.10	0.49	752.47	1.77	34.03	6.62	99.84	4.56

ID Campo	As		Ba		Cr		Cu	
	mg/Kg	% CV	mg/Kg	% CV	mg/Kg	% CV	mg/Kg	% CV
LD	5.00		30.00		10.00		9.00	
B3-LC (0-5cm)	20.26	8.44	690.94	3.60	89.02	4.62	73.02	3.82
B3-LC (25cm)	30.55	4.29	717.94	4.16	104.09	5.64	131.05	3.50
B3-LC (50cm)	24.03	6.59	794.71	3.38	83.05	4.54	133.24	2.82
B3-LD (0-5cm)	21.62	3.63	764.70	1.12	89.85	3.60	92.70	3.00
B3-LD (25cm)	21.69	3.25	700.35	1.05	85.94	1.43	91.18	5.07
B3-LD (50cm)	18.88	10.99	791.30	1.48	94.33	5.01	81.65	2.72
B3-LE (0-5cm)	21.79	12.87	684.86	1.37	84.27	4.91	64.23	1.83
B3-LE (25cm)	26.85	5.36	766.35	3.87	80.05	4.09	59.08	2.01
B3-LE (50cm)	23.91	4.03	702.13	1.53	80.62	4.27	57.26	3.55
B3-RB (0-5cm)	28.43	3.07	773.84	0.94	93.87	8.46	168.53	4.00
B3-RB (25cm)	21.96	8.81	723.76	1.77	96.45	4.07	145.11	2.77
B3-RB (50cm)	21.24	14.66	810.78	1.70	96.78	1.36	152.87	5.28
B3-RB (100cm)	25.97	3.49	725.30	3.41	88.71	6.51	136.90	2.63
B3-RB (200cm)	18.19	13.28	760.29	4.39	95.80	2.98	120.15	2.99
B3-RB (300cm)	18.94	3.65	711.02	1.64	86.62	1.63	61.34	1.95
B3-RC (0-5cm)	25.41	7.60	807.41	1.16	94.15	4.76	162.62	2.56
B3-RC (25cm)	24.05	2.42	928.82	4.05	91.37	4.83	147.10	2.29
B3-RC (50cm)	22.88	7.19	880.14	1.59	97.47	1.52	156.03	2.13

NA= No aplica

<LOD= Debajo del límite de detección.



ID Campo	Fe		Mn		Pb		Zn	
	%	% CV	mg/Kg	% CV	mg/Kg	% CV	mg/Kg	% CV
LD	0.10		40.00		6.00		7.00	
B3-LC (0-5cm)	3.45	0.24	609.87	2.27	45.08	0.96	82.96	3.86
B3-LC (25cm)	3.35	0.48	868.18	2.77	70.73	3.83	127.88	3.92
B3-LC (50cm)	3.91	0.31	788.42	0.85	45.56	3.83	105.00	1.61
B3-LD (0-5cm)	2.78	0.72	712.82	1.49	34.77	1.16	99.05	3.70
B3-LD (25cm)	3.12	0.22	758.68	4.52	40.32	2.16	101.83	6.85
B3-LD (50cm)	3.48	0.14	854.81	4.46	38.60	1.73	90.97	9.31
B3-LE (0-5cm)	2.08	0.35	630.70	3.72	26.12	7.42	75.84	4.24
B3-LE (25cm)	2.29	0.12	683.98	6.16	23.56	9.52	75.18	6.21
B3-LE (50cm)	2.27	0.48	558.32	3.67	20.24	3.89	74.92	4.26
B3-RB (0-5cm)	2.81	0.78	712.56	0.24	42.91	6.66	119.83	1.83
B3-RB (25cm)	2.11	0.14	498.46	1.40	38.41	5.65	108.57	2.26
B3-RB (50cm)	2.31	0.12	552.36	2.59	74.97	2.68	98.86	2.79
B3-RB (100cm)	2.47	0.55	600.80	3.74	34.33	3.25	100.52	4.00
B3-RB (200cm)	2.15	0.57	590.08	1.97	34.11	5.90	97.63	3.07
B3-RB (300cm)	2.27	0.06	584.52	1.74	29.19	1.89	86.05	0.82
B3-RC (0-5cm)	2.53	0.41	639.65	0.95	47.68	4.26	106.51	2.46
B3-RC (25cm)	2.77	0.52	725.74	0.36	38.22	3.11	109.22	3.10
B3-RC (50cm)	2.55	0.45	660.37	2.19	35.62	5.70	109.48	2.32

ID Campo	As		Ba		Cr		Cu	
	mg/Kg	% CV	mg/Kg	% CV	mg/Kg	% CV	mg/Kg	% CV
LD	5.00		30.00		10.00		9.00	
B3-RD (0-5cm)	20.56	3.17	742.35	2.80	86.04	2.85	72.05	0.97
B3-RD (25cm)	28.66	11.39	631.75	1.43	102.10	1.62	98.73	3.85
B3-RD (50cm)	21.01	2.05	727.75	5.19	91.42	1.30	80.21	2.48
B3-RE (0-5cm)	19.10	8.25	546.65	2.90	70.36	4.10	57.24	3.69
B3-RE (25cm)	20.31	12.86	718.72	2.55	77.06	3.70	75.36	2.81
B3-RE (50cm)	24.76	4.88	622.02	3.16	79.96	8.16	80.91	1.76

NA= No aplica

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Laboratorio Nacional de Geoquímica y Minerología
Universidad Nacional Autónoma de México
Geoquímica Ambiental



ID Campo	Fe		Mn		Pb		Zn	
	%	% CV	mg/Kg	% CV	mg/Kg	% CV	mg/Kg	% CV
LD	0.10		40.00		6.00		7.00	
B3-RD (0-5cm)	3.22	0.65	691.53	1.32	29.62	7.74	92.52	2.97
B3-RD (25cm)	3.21	0.55	1002.41	0.22	55.25	1.98	145.18	2.59
B3-RD (50cm)	2.99	0.69	760.00	0.96	40.72	1.36	103.48	2.03
B3-RE (0-5cm)	3.06	0.29	540.00	4.51	22.26	2.94	73.60	4.13
B3-RE (25cm)	3.21	0.45	699.00	6.44	30.04	8.67	91.63	2.87
B3-RE (50cm)	2.89	0.33	771.18	1.13	42.51	3.27	110.73	2.66

ID Campo	As		Ba		Cr		Cu	
	mg/Kg	% CV	mg/Kg	% CV	mg/Kg	% CV	mg/Kg	% CV
LD	5.00		30.00		10.00		9.00	
B4-A(0-5cm)	28.67	10.65	872.65	1.77	87.94	1.91	117.63	1.87
B4-A(25cm)	22.07	8.16	759.86	2.07	81.94	4.16	110.24	4.88
B4-A(50cm)	24.37	4.01	784.94	2.59	85.38	1.06	101.81	5.18
B4-A(55-65cm)	34.49	1.94	811.76	2.26	82.42	3.01	243.87	1.60
B4-A(100cm)	26.11	6.54	849.48	2.17	89.89	3.94	112.85	4.71
B4-A(150cm)	24.61	3.26	869.79	1.39	81.43	7.43	107.78	1.29
B4-A(190cm)	21.37	6.29	887.59	2.93	85.02	5.80	71.52	5.92
B4-LB(0-5cm)	24.65	14.57	811.14	2.70	91.16	10.02	157.07	1.09
B4-LB(20-70cm)	29.56	2.86	683.93	1.66	111.70	1.98	113.28	3.75
B4-LB(70-140cm)	26.52	3.98	681.42	0.73	88.07	2.61	153.88	3.01
B4-LB(140-190cm)	21.88	4.36	833.91	4.15	84.98	6.08	80.49	5.99
B4-LB(190-240cm)	23.51	11.31	846.16	1.35	100.98	1.27	94.73	2.90
B4-LB(240-260cm)	25.50	5.37	648.03	1.80	90.07	4.05	119.70	1.90
B4-LC(0-5cm)	23.93	7.48	733.87	2.39	81.90	7.44	108.11	3.19
B4-LC(25cm)	24.33	15.08	704.89	2.90	101.11	5.29	99.58	2.45
B4-LC(50cm)	22.72	7.91	687.48	1.04	79.31	1.87	150.82	1.68
B4-LC(100cm)	23.62	8.34	669.62	3.21	80.56	1.05	159.08	2.02
B4-LD(0-5cm)	24.42	13.25	711.95	5.02	87.92	4.57	113.28	3.85
B4-LD(25cm)	21.70	12.77	616.04	0.93	94.37	7.09	106.89	3.70
B4-LD(50cm)	19.02	3.74	703.38	3.11	88.20	2.81	71.16	5.11
B4-LE(0-5cm)	20.43	1.53	433.87	5.52	97.84	1.92	104.59	1.80
B4-LE(25cm)	28.21	5.14	718.50	1.07	90.85	1.51	68.77	2.45
B4-LE(50cm)	22.92	4.86	869.50	3.25	92.47	5.65	69.08	3.19



ID Campo	Fe		Mn		Pb		Zn	
	%	% CV	mg/Kg	% CV	mg/Kg	% CV	mg/Kg	% CV
LD	0.10		40.00		6.00		7.00	
B4-A(0-5cm)	3.91	0.45	789.68	5.17	33.79	7.33	103.69	2.22
B4-A(25cm)	2.93	0.16	617.54	1.21	36.83	3.42	86.98	0.17
B4-A(50cm)	2.34	0.37	536.73	3.19	31.71	1.99	93.77	3.20
B4-A(55-65cm)	2.84	0.62	849.87	2.74	47.29	1.85	173.10	1.01
B4-A(100cm)	2.79	0.30	646.63	5.94	36.43	3.61	99.44	2.53
B4-A(150cm)	2.40	0.60	561.59	4.39	30.24	5.19	89.84	2.91
B4-A(190cm)	2.44	0.31	555.63	2.35	28.47	2.23	79.83	2.22
B4-LB(0-5cm)	2.96	0.57	664.67	2.24	38.43	4.99	100.25	5.80
B4-LB(20-70cm)	2.97	0.18	786.78	1.30	56.06	1.35	119.44	2.40
B4-LB(70-140cm)	3.02	0.40	752.84	6.26	50.26	2.82	114.44	1.18
B4-LB(140-190cm)	2.76	0.25	707.86	1.38	28.40	8.33	86.80	3.48
B4-LB(190-240cm)	2.42	0.11	872.85	2.88	38.27	2.68	100.43	3.45
B4-LB(240-260cm)	2.74	0.31	715.22	3.85	46.90	3.99	124.21	3.81
B4-LC(0-5cm)	2.94	0.46	611.37	4.75	42.63	3.77	92.522	2.38
B4-LC(25cm)	2.91	0.57	658.06	1.70	49.98	0.25	97.09	3.92
B4-LC(50cm)	3.21	0.29	767.04	1.60	44.58	11.91	105.15	4.35
B4-LC(100cm)	3.05	0.27	725.10	3.48	47.25	3.38	111.71	1.70
B4-LD(0-5cm)	3.12	0.37	670.23	2.07	37.53	3.20	94.70	2.51
B4-LD(25cm)	3.10	0.33	817.44	6.98	44.92	6.36	106.30	2.53
B4-LD(50cm)	2.79	0.23	735.25	3.25	34.80	3.62	97.50	4.36
B4-LE(0-5cm)	2.30	0.07	656.57	0.36	31.98	2.44	92.24	4.23
B4-LE(25cm)	2.81	0.27	544.92	3.73	23.41	4.66	68.91	4.42
B4-LE(50cm)	2.75	0.52	682.68	2.44	24.99	7.38	70.28	5.71

ID Campo	As		Ba		Cr		Cu	
	mg/Kg	% CV	mg/Kg	% CV	mg/Kg	% CV	mg/Kg	% CV
LD	5.00		30.00		10.00		9.00	
B4-RB(0-5cm)	28.49	4.29	910.54	1.01	89.10	3.80	102.70	1.11
B4-RB(25cm)	25.01	8.96	794.62	4.12	87.01	3.51	120.01	4.04
B4-RB(50cm)	24.88	7.77	731.19	2.96	101.71	1.90	120.86	4.87
B4-RB(100cm)	21.97	6.36	790.34	2.61	87.29	4.54	125.92	1.07
B4-RB(150cm)	23.42	5.62	783.57	7.30	85.52	4.38	103.40	3.26



Laboratorio Nacional de Geoquímica y Minerología
Universidad Nacional Autónoma de México
Geoquímica Ambiental



ID Campo	Fe		Mn		Pb		Zn	
	%	% CV	mg/Kg	% CV	mg/Kg	% CV	mg/Kg	% CV
LD	0.10		40.00		6.00		7.00	
B4-RB(0-5cm)	2.79	0.40	656.05	0.33	38.34	7.76	105.18	1.05
B4-RB(25cm)	2.58	0.19	671.01	4.22	37.27	1.76	105.66	4.29
B4-RB(50cm)	3.07	0.23	778.38	3.41	53.39	2.56	108.42	5.71
B4-RB(100cm)	2.52	0.46	502.49	2.08	37.98	10.49	93.20	7.26
B4-RB(150cm)	2.49	0.33	570.75	2.48	32.88	4.71	89.05	3.70

ID Campo	As		Ba		Cr		Cu	
	mg/Kg	% CV	mg/Kg	% CV	mg/Kg	% CV	mg/Kg	% CV
LD	5.00		30.00		10.00		9.00	
B4-RC(0-5cm)	22.84	3.48	609.64	3.68	86.82	5.04	124.32	3.42
B4-RC(25cm)	24.18	7.08	672.02	1.63	93.26	2.52	133.94	3.83
B4-RC(50cm)	21.89	3.30	683.92	4.59	129.36	0.97	144.23	2.79
B4-RC(100cm)	19.22	9.90	751.15	1.43	86.29	9.12	91.90	3.29
B4-RD(0-5cm)	22.48	8.28	597.08	1.20	99.59	3.26	110.79	5.67
B4-RD(25cm)	20.47	4.79	718.94	2.69	97.73	2.73	101.24	2.25
B4-RD(50cm)	21.07	3.54	725.02	2.04	95.44	4.12	76.07	3.84
B4-RE(0-5cm)	20.06	9.57	674.01	1.12	94.04	2.93	80.18	0.84
B4-RE(25cm)	19.68	12.83	815.15	1.47	92.62	2.05	74.53	1.90
B4-RE(50cm)	19.89	10.30	784.38	2.29	92.30	11.17	72.67	5.46
B5-A(0-5cm)	19.27	3.46	726.16	0.47	101.98	9.49	54.80	6.66
B5-A(10cm)	22.17	0.75	714.49	1.39	109.05	3.13	82.48	5.00
B5-A(25cm)	21.82	10.61	727.41	0.44	98.29	4.52	79.54	2.33
B5-A(50cm)	30.31	1.58	795.79	1.22	107.97	4.89	97.82	4.09
B5-A(100cm)	25.87	4.19	728.27	0.32	116.08	7.81	78.82	2.68
B5-A(150cm)	19.54	4.40	706.22	2.40	106.30	5.65	67.19	5.91
B5-A(200cm)	19.91	2.76	797.67	1.47	106.97	8.07	79.85	1.70
B5-A(>300cm)	17.50	0.44	802.80	0.94	110.40	4.31	61.49	1.97
B5-LB (0-10cm)	22.97	3.05	789.97	5.32	93.59	3.95	111.37	0.59
B5-LB (10cm)	26.41	11.36	717.37	3.92	98.17	1.52	96.64	1.61
B5-LB (25cm)	45.99	1.81	812.52	1.83	95.90	1.22	93.48	6.07
B5-LB (50cm)	21.04	12.10	719.75	3.68	91.64	3.56	90.78	1.10

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Laboratorio Nacional de Geoquímica y Minerología
Universidad Nacional Autónoma de México
Geoquímica Ambiental



ID Campo	Fe		Mn		Pb		Zn	
	%	% CV	mg/Kg	% CV	mg/Kg	% CV	mg/Kg	% CV
LD	0.10		40.00		6.00		7.00	
B4-RC(0-5cm)	2.94	0.19	740.20	1.72	46.16	1.38	116.92	7.87
B4-RC(25cm)	3.40	0.11	752.26	1.46	49.33	1.53	106.27	2.97
B4-RC(50cm)	3.63	0.62	697.62	2.22	47.75	1.03	99.93	6.41
B4-RC(100cm)	2.41	0.67	553.31	3.07	32.21	6.07	77.50	1.99
B4-RD(0-5cm)	3.01	0.04	754.77	1.38	52.20	3.21	113.15	2.91
B4-RD(25cm)	3.06	0.42	732.35	2.40	45.90	2.23	104.89	4.61
B4-RD(50cm)	2.95	0.50	691.86	1.99	34.07	1.94	92.44	5.13
B4-RE(0-5cm)	2.68	0.50	767.93	2.53	29.64	5.31	94.34	5.04
B4-RE(25cm)	3.01	0.27	776.64	3.44	30.17	4.99	96.73	1.99
B4-RE(50cm)	2.84	0.10	777.83	2.05	26.97	3.24	95.85	1.70
B5-A(0-5cm)	2.70	0.19	434.49	4.25	26.14	4.13	59.41	6.19
B5-A(10cm)	2.83	0.09	674.17	3.17	35.25	4.95	83.56	4.60
B5-A(25cm)	2.40	0.20	642.58	0.82	33.50	4.79	80.34	4.13
B5-A(50cm)	2.37	0.35	556.35	3.36	28.73	7.54	81.35	1.18
B5-A(100cm)	2.64	0.25	593.06	0.64	32.63	5.77	74.84	8.35
B5-A(150cm)	2.21	0.48	518.29	1.86	27.99	0.58	62.38	1.59
B5-A(200cm)	2.66	0.76	566.30	3.84	29.40	1.35	65.45	3.93
B5-A(>300cm)	2.52	0.08	560.94	2.79	25.46	1.73	65.27	1.41
B5-LB (0-10cm)	3.72	0.27	1212.19	3.50	45.33	2.42	95.75	3.71
B5-LB (10cm)	3.61	0.45	707.38	2.10	41.24	3.94	94.89	3.67
B5-LB (25cm)	3.05	0.55	758.05	1.38	31.36	3.59	85.39	1.72
B5-LB (50cm)	2.88	1.29	672.09	4.71	40.87	5.08	82.03	4.56

ID Campo	As		Ba		Cr		Cu	
	mg/Kg	% CV	mg/Kg	% CV	mg/Kg	% CV	mg/Kg	% CV
LD	5.00		30.00		10.00		9.00	
B5-LB (100cm)	20.19	3.34	765.17	3.66	95.56	3.78	96.04	2.17
B5-LB (150cm)	16.98	4.06	814.32	3.79	89.76	2.64	84.76	1.91
B5-LB (200cm)	18.89	12.33	760.05	1.50	93.55	5.11	79.42	4.98
B5-LB (300cm)	18.48	8.62	860.54	1.84	79.71	5.45	85.76	1.27
B5-LB (350cm)	17.89	6.19	844.14	4.72	89.85	1.28	76.12	2.78



Laboratorio Nacional de Geoquímica y Minerología
Universidad Nacional Autónoma de México
Geoquímica Ambiental



ID Campo	Fe		Mn		Pb		Zn	
	%	% CV	mg/Kg	% CV	mg/Kg	% CV	mg/Kg	% CV
LD	0.10		40.00		6.00		7.00	
B5-LB (100cm)	3.07	0.32	762.33	1.76	33.99	5.59	81.49	2.23
B5-LB (150cm)	2.93	0.36	646.92	2.55	31.50	5.35	76.35	4.28
B5-LB (200cm)	2.7	0.44	473.42	4.55	28.71	0.66	70.44	3.91
B5-LB (300cm)	3.08	0.16	601.01	3.12	34.35	4.69	76.05	2.51
B5-LB (350cm)	2.65	0.40	606.30	4.23	25.93	2.57	88.19	1.59

ID Campo	As		Ba		Cr		Cu	
	mg/Kg	% CV	mg/Kg	% CV	mg/Kg	% CV	mg/Kg	% CV
LD	5.00		30.00		10.00		9.00	
B5-LC (5cm)	28.54	7.87	767.19	5.12	94.17	5.15	124.29	1.91
B5-LC (25cm)	21.87	12.41	647.51	3.08	81.16	3.15	139.32	1.32
B5-LC (50cm)	23.62	4.93	593.26	5.05	99.07	3.64	144.79	1.18
B5-LD (5cm)	24.21	7.18	773.62	3.26	81.64	5.81	108.60	3.70
B5-LD (25cm)	24.83	2.36	655.94	3.71	130.79	2.39	101.62	2.15
B5-LD (50cm)	21.83	1.81	570.86	0.50	95.32	1.99	96.45	4.31
B5-RB(0-5 cm)	22.86	4.07	839.32	0.87	79.83	1.86	90.81	2.86
B5-RB(25cm)	51.83	2.93	721.09	3.44	92.32	3.43	671.13	1.10
B5-RB(50cm)	20.11	4.09	816.85	2.57	80.68	2.13	96.18	2.33
B5-RB(100cm)	18.73	14.61	839.65	0.58	81.58	1.77	92.82	1.94
B5-RB(200cm)	32.20	5.66	680.47	0.50	87.64	1.74	82.67	2.35
B5-RB(300cm)	28.07	1.85	821.54	0.74	88.04	8.52	94.75	1.11
B5-RC(0-5cm)	27.88	2.56	558.90	3.94	91.84	7.74	106.29	2.14
B5-RC(25cm)	25.44	0.77	619.63	3.46	103.68	2.12	95.44	0.37
B5-RC(50cm)	18.31	6.42	716.26	1.95	79.73	2.20	75.17	4.96
B5-RD(0-5cm)	20.00	6.59	641.60	3.44	93.62	4.26	116.02	0.57
B5-RD(25cm)	21.78	9.53	588.98	3.24	102.37	3.18	128.81	1.16
B5-RD(50cm)	24.12	12.90	674.10	1.83	108.04	2.77	152.34	2.13
B5-RD'(0-5cm)	25.01	3.20	843.82	2.96	88.17	4.53	121.00	3.71
B5-RD'(25cm)	21.08	6.02	754.02	2.39	95.76	1.40	110.43	5.29
B5-RD'(50cm)	22.19	9.42	622.23	1.91	93.75	1.87	156.52	3.29
B6-A(0-5cm)	20.24	1.64	609.15	4.37	108.73	5.04	45.73	12.42
B6-LB	23.54	5.92	727.48	2.96	92.88	0.44	52.69	4.03
B6-RB	19.34	1.59	606.42	0.89	95.56	5.19	42.85	3.95

NA= No aplica

<LOD= Debajo del límite de detección.



Laboratorio Nacional de Geoquímica y Minerología
 Universidad Nacional Autónoma de México
 Geoquímica Ambiental



ID Campo	Fe		Mn		Pb		Zn	
	%	% CV	mg/Kg	% CV	mg/Kg	% CV	mg/Kg	% CV
LD	0.10		40.00		6.00		7.00	
B5-LC (5cm)	3.39	0.19	675.93	2.81	46.15	1.54	102.76	1.03
B5-LC (25cm)	2.89	0.08	693.29	4.00	37.30	13.39	91.83	4.03
B5-LC (50cm)	2.91	0.55	759.68	3.08	46.69	3.05	108.35	3.77
B5-LD (5cm)	4.26	0.10	801.20	3.17	35.96	9.45	91.37	0.95
B5-LD (25cm)	3.47	0.57	714.93	4.12	38.59	3.24	96.97	3.12
B5-LD (50cm)	2.59	0.42	1094.19	1.53	36.17	4.70	111.14	6.44
B5-RB(0-5 cm)	2.70	0.41	543.83	6.96	33.03	2.02	83.31	6.04
B5-RB(25cm)	3.73	0.40	461.95	2.43	55.09	3.00	215.40	0.82
B5-RB(50cm)	2.30	0.19	564.43	3.98	32.85	3.67	80.52	5.27
B5-RB(100cm)	2.44	0.93	570.50	7.48	25.03	9.51	83.25	1.69
B5-RB(200cm)	2.97	0.54	1001.83	3.53	38.10	2.82	108.52	3.23
B5-RB(300cm)	2.88	0.31	1425.64	0.29	39.41	2.68	108.35	4.51
B5-RC(0-5cm)	3.36	0.72	896.29	5.93	56.02	0.42	127.92	3.08
B5-RC(25cm)	3.04	0.58	950.33	1.21	54.36	2.87	123.97	4.90
B5-RC(50cm)	3.21	0.13	760.08	1.30	33.59	2.38	87.16	1.95
B5-RD(0-5cm)	2.99	0.83	649.78	3.30	45.04	4.17	105.79	0.76
B5-RD(25cm)	3.05	0.16	770.73	2.91	44.11	4.91	107.24	2.62
B5-RD(50cm)	3.17	0.43	890.93	3.27	56.30	7.15	119.93	2.42
B5-RD'(0-5cm)	4.42	0.65	711.78	4.59	36.92	5.82	83.84	6.73
B5-RD'(25cm)	3.11	0.23	774.23	4.43	42.17	2.98	99.60	4.04
B5-RD'(50cm)	3.19	0.28	810.89	1.19	53.87	2.36	121.36	1.41
B6-A(0-5cm)	2.24	0.17	529.73	2.10	24.50	0.66	50.38	6.26
B6-LB	2.02	0.27	506.11	2.93	22.30	8.99	55.23	7.41
B6-RB	1.76	0.32	447.76	4.09	21.15	2.98	49.62	3.41

ID Campo	As		Ba		Cr		Cu	
	mg/Kg	% CV	mg/Kg	% CV	mg/Kg	% CV	mg/Kg	% CV
LD	5.00		30.00		10.00		9.00	
B6-RC(0-5cm)	22.15	9.56	617.04	1.10	110.02	4.18	46.68	2.65
B6-RC(5-30cm)	23.93	2.10	671.58	1.17	110.57	2.29	70.22	7.12
B6-RC(30-60cm)	23.07	6.03	512.98	2.78	121.12	0.41	48.68	1.68
B6-RC(60-80cm)	21.22	8.93	742.70	3.23	109.88	3.53	51.01	7.52
B6-RC(80-110cm)	23.23	2.30	742.86	1.42	138.33	3.69	46.22	4.74



Laboratorio Nacional de Geoquímica y Minerología
Universidad Nacional Autónoma de México
Geoquímica Ambiental



ID Campo	Fe		Mn		Pb		Zn	
	%	% CV	mg/Kg	% CV	mg/Kg	% CV	mg/Kg	% CV
LD	0.10		40.00		6.00		7.00	
B6-RC(0-5cm)	2.44	0.43	556.93	4.95	26.33	11.40	59.66	6.02
B6-RC(5-30cm)	2.63	0.56	532.41	3.38	30.24	5.14	65.83	0.88
B6-RC(30-60cm)	2.61	0.31	710.28	3.25	32.59	3.11	65.02	5.61
B6-RC(60-80cm)	2.89	0.23	582.27	3.56	25.73	8.17	48.51	4.78
B6-RC(80-110cm)	2.75	0.32	666.61	2.00	25.41	4.91	52.88	4.06

ID Campo	As		Ba		Cr		Cu	
	mg/Kg	% CV	mg/Kg	% CV	mg/Kg	% CV	mg/Kg	% CV
LD	5.00		30.00		10.00		9.00	
B6-LC(0-5cm)	26.84	7.86	609.43	1.31	120.86	7.81	53.91	10.56
B6-LC(5-30cm)	22.45	3.15	696.76	2.81	110.73	6.09	71.37	3.82
B6-LC(30-60cm)	21.99	13.05	574.31	1.25	121.36	4.28	53.86	2.58
B6-LC(60-85cm)	22.40	3.98	661.83	0.34	111.75	1.48	56.67	1.95
B6-LC(85-100cm)	22.45	7.14	713.22	1.98	110.84	7.12	44.91	7.48
B7-A (0-5cm)	17.44	4.94	699.30	3.07	121.17	0.80	50.07	2.17
B7-LB (0-5cm)	19.23	6.95	685.73	0.82	116.04	3.54	59.84	8.82
B7-LC (0-5cm)	17.28	17.55	768.40	1.12	118.53	4.14	60.14	3.87
B7-LC (25cm)	21.49	3.94	712.13	2.24	123.88	3.94	64.47	3.22
B7-LC (50cm)	19.21	6.46	697.13	1.09	132.59	3.29	65.20	4.22
B7-LC (100cm)	24.05	3.35	547.46	2.12	140.35	4.51	88.43	1.21
B7-LD (0-5cm)	21.24	3.43	599.10	0.87	153.84	1.67	62.35	9.39
B7-LD (30cm)	24.79	8.08	405.01	4.27	137.74	2.77	51.53	3.70
B7-RB (0-5cm)	27.50	10.23	679.76	1.05	122.67	4.76	56.58	2.37
B7-RC (0-5cm)	13.23	12.33	324.96	0.89	114.25	2.30	53.84	0.20
B7-RC (25cm)	13.92	9.35	511.67	2.31	107.92	4.35	48.50	7.61
B7-RC (50cm)	13.29	8.05	518.56	0.96	134.73	6.40	50.03	10.80
B8-A (0-5cm)	20.90	9.06	808.03	3.48	84.65	6.38	71.13	2.24
B8-LB (0-5cm)	15.28	4.54	905.75	1.95	82.73	2.58	67.75	2.65
B8-LC (0-5cm)	20.99	4.53	654.79	2.38	134.32	4.39	61.19	9.14
B8-LC (5-25cm)	19.91	6.85	671.34	3.12	127.72	5.56	55.81	8.40
B8-LC (25-50cm)	17.78	5.81	676.97	3.23	141.85	7.91	63.75	2.84
B8-LC (50-75cm)	17.03	9.25	716.77	3.35	134.98	3.18	48.89	6.97
B8-LC (+75cm)	16.51	5.71	675.17	1.21	111.92	3.88	47.11	3.65



Laboratorio Nacional de Geoquímica y Minerología
Universidad Nacional Autónoma de México
Geoquímica Ambiental



ID Campo	Fe		Mn		Pb		Zn	
	%	% CV	mg/Kg	% CV	mg/Kg	% CV	mg/Kg	% CV
LD	0.10		40.00		6.00		7.00	
B6-LC(0-5cm)	2.62	0.31	655.28	1.33	31.88	4.89	63.03	6.23
B6-LC(5-30cm)	2.74	0.86	699.97	2.79	34.06	1.06	70.63	3.61
B6-LC(30-60cm)	2.60	0.81	518.42	1.59	45.37	5.56	56.37	4.98
B6-LC(60-85cm)	2.74	0.44	623.30	3.37	33.89	5.16	59.69	2.44
B6-LC(85-100cm)	2.42	0.24	514.78	4.82	26.70	4.89	56.95	1.90
B7-A (0-5cm)	2.08	0.19	472.31	1.07	24.08	2.25	51.08	6.18
B7-LB (0-5cm)	2.30	0.24	466.82	1.83	23.78	3.82	49.19	6.88
B7-LC (0-5cm)	2.84	0.25	580.39	4.52	25.39	7.61	57.99	6.04
B7-LC (25cm)	2.75	0.35	583.87	3.23	26.66	4.57	58.94	2.24
B7-LC (50cm)	3.24	0.51	574.91	1.01	26.76	7.36	58.72	1.43
B7-LC (100cm)	3.10	0.17	744.31	1.74	33.99	4.70	81.01	2.39
B7-LD (0-5cm)	5.77	0.18	882.44	1.16	22.79	3.63	66.46	2.57
B7-LD (30cm)	4.03	0.25	654.89	1.88	21.19	5.42	53.77	7.74
B7-RB (0-5cm)	2.30	0.32	503.26	3.40	22.74	9.61	55.68	2.58
B7-RC (0-5cm)	2.57	0.18	627.22	2.51	23.42	6.42	76.33	4.87
B7-RC (25cm)	3.28	0.10	799.58	0.75	19.46	6.89	64.26	4.25
B7-RC (50cm)	3.22	0.21	741.15	2.06	21.07	3.00	58.23	3.97
B8-A (0-5cm)	2.26	0.31	438.81	3.22	21.15	8.81	60.70	5.91
B8-LB (0-5cm)	2.15	0.85	408.64	7.06	21.77	10.77	60.13	3.02
B8-LC (0-5cm)	3.60	0.51	610.99	4.04	25.88	3.25	59.75	5.40
B8-LC (5-25cm)	3.72	0.22	593.63	1.33	24.61	3.52	56.49	5.16
B8-LC (25-50cm)	4.48	0.26	646.95	0.99	27.78	3.44	58.80	5.54
B8-LC (50-75cm)	3.12	0.47	462.36	3.22	23.67	1.99	47.36	3.75
B8-LC (+75cm)	3.11	0.25	557.03	6.06	23.45	8.21	57.03	3.58

ID Campo	As		Ba		Cr		Cu	
	mg/Kg	% CV	mg/Kg	% CV	mg/Kg	% CV	mg/Kg	% CV
LD	5.00		30.00		10.00		9.00	
B8-RB (0-5cm)	17.07	4.36	786.97	1.89	97.88	3.96	79.70	2.18
B8-RC (0-5cm)	18.43	6.98	638.74	1.48	87.96	7.08	81.93	9.31
B8-RC (5-25cm)	21.65	7.12	965.25	3.05	100.13	6.75	89.94	3.66
B8-RC (25-50cm)	17.18	14.45	801	1.33	108.08	5.49	86.90	1.75
B8-RC (+50cm)	38.86	1.00	425.62	3.22	79.03	4.84	51.56	8.04



ID Campo	Fe		Mn		Pb		Zn	
	%	% CV	mg/Kg	% CV	mg/Kg	% CV	mg/Kg	% CV
LD	0.10		40.00		6.00		7.00	
B8-RB (0-5cm)	2.98	0.33	542.51	3.32	23.82	5.63	66.56	7.94
B8-RC (0-5cm)	3.30	0.43	530.77	7.20	27.17	6.81	67.05	8.77
B8-RC (5-25cm)	3.66	0.13	665.54	5.97	42.22	3.47	73.77	3.17
B8-RC (25-50cm)	4.05	0.65	1148.71	1.13	43.76	1.06	75.29	1.05
B8-RC (+50cm)	3.59	0.17	2520.16	0.34	16.21	2.24	72.27	1.77

NA= No aplica

<LOD= Debajo del límite de detección.

CONTROL DE CALIDAD

pH y CE:

Para la precisión de los análisis de pH se determinaron algunas mediciones por duplicado reportando un %DPR de las mediciones (menor al 10%).

ID campo	pH	CE	%DPR pH	%DPR CE
B5-LC (25)	8.33	52.8	1.09	9.21
	8.24	57.9		
B5-LD (25)	8.4	41.1	1.68	7.84
	8.26	38		
B4-RB (25)	8.3	31.8	4.69	7.27
	7.92	34.2		
B3-RD (25)	8.6	89	2.95	6.94
	8.35	95.4		
B3-A (5)	8.15	34	1.85	1.24
	7.94	34.6		
B6-A (5)	8.55	54.1	0.00	2.37
	8.55	55.4		
B2-LB (50)	8.16	37.1	2.86	7.84
	7.93	34.3		
B7-RC (25)	8.32	372	0.60	1.60
	8.37	378		



FRX:

Para la precisión de los análisis de FRX las mediciones se determinaron por triplicado, el valor reportado es el promedio de las tres determinaciones reportando también el % del coeficiente de variación (CV) de las mediciones (menor al 20%).

Para determinar la exactitud en FRX se utilizaron estándares certificados (TILL-4 y NIST-2710) como control analítico los cuales fueron analizados como muestra para determinar su concentración las concentraciones se encontraron entre el 84 y el 112% lo cual indica un buen desempeño del método de análisis.

Estándares	%Exactitud							
	As	Ba	Cu	Cr	Fe	Mn	Pb	Zn
TILL-4	97.97	98.94	113.74	116.97	113.74	86.70	95.86	80.04
NIST-2710	100.7	NA	112.1	93.7	102.8	84.9	87.7	99.05

Sin mas por al momento quedo a sus ordenes.

Analistas:

Revisó:

QFB. Fabiola Vega García

M en C Luis Gerardo Martínez Jardines

M en C Alicia Santana Silva

QA Daniel Ramos Pérez

Víctor Montaña Jiménez



INFORME DE RESULTADOS
SONORA

Datos del solicitante:

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Información de las muestras

Fecha de recepción de muestras: 13 de julio del 2015

Se recibieron 222 muestras de suelos preservadas e identificadas adecuadamente, en bolsas de plástico, etiquetadas como S1 A LA S9 con diferentes profundidades y claves adjunta A, LB, LC, LE ,RB, RD, RC y RE para cada una.

Información de los análisis

En el laboratorio de Geoquímica Ambiental las muestras fueron homogeneizadas y tamizadas por malla N° 10 para su análisis de pH, Conductividad eléctrica y FRX.

El pH se determinó con un potenciómetro Hanna Instruments, HI-98185 y se siguió el método estandarizado 9040 C de la US-EPA .

Conductividad eléctrica (CE) determinó con un conductímetro OAKTON Con 700. y se siguió el método APHA 1992. Standard methods for the examination of water and wastewater.

Fluorescencia de rayos X. El análisis se determinó con un equipo de Fluorescencia de Rayos X, NITON FXL 950 de Thermo Scientific y se siguió el método EPA 6200. La determinación fue realizada por triplicado con un tiempo de medición de 90s en el modo de suelo y 31 s en el modo de mina para Fe. Los elementos cuantificados en cada determinación se reportan en mg/kg (ppm) para el modo de suelo y (%) para el modo de mina.



Listado de recepción de muestras:

ID Campo	coordenadas		ID Campo	coordenadas	
	X	Y		X	Y
S1-A (0-5cm)	579052	3354518	S2-RE (0-5cm)	573913	3340335
S1-LB (0-5cm)	579053	3354516	S2-RE (25cm)	573913	3340335
S1-LC (5cm)	579057	3354515	S2-RE (50cm)	573913	3340335
S1-LC (25cm)	579057	3354515	S3-A (0-5cm)	575540	3324301
S1-LD(5cm)	579080	3354497	S3-LB (0-5cm)	575528	3324320
S1-LD(25cm)	579080	3354497	S3-LB (25cm)	575528	3324320
S1-LD (50cm)	579080	3354497	S3-LC (0-5cm)	575468	3324300
S1-RB (0-5cm)	579048	3354521	S3-LC (25cm)	575468	3324300
S1-RB'(0-5cm)	579036	3354531	S3-LC (50cm)	575468	3324300
S1-RB'(25cm)	579036	3354531	S3-LD (0-5cm)	575309	3324207
S1-RB'(50cm)	579036	3354531	S3-LD (25cm)	575309	3324207
S1-RC (0-5cm)	579065	3354603	S3-LD (50cm)	575309	3324207
S1-RC (25cm)	579065	3354603	S3-LE (0-5cm)	574330	3324346
S1-RC roca	579065	3355603	S3-LE (25cm)	574330	3324346
S1-RD (0-5cm)	579043	3354612	S3-LE (50cm)	574330	3324346
S1-RE (0-5cm)	579030	3354644	S3-RB (0-5cm)	575546	3324319
S2-A (0-5cm)	573791	3340390	S3-RB (25cm)	575546	3324319
S2-LB (0-5cm)	573772	3340394	S3-RC (0-5cm)	575544	3324318
S2-LB (25cm)	573772	3340394	S3-RC (25cm)	575544	3324318
S2-LC (0-5cm)	573770	3340395	S3-RC (50cm)	575544	3324318
S2-LC (25cm)	573770	3340395	S3-RD (0-5cm)	575548	3324324
S2-LC (50cm)	573770	3340395	S3-RD (25cm)	575548	3324324
S2-LC roca	573770	3340395	S3-RD (50cm)	575548	3324324
S2-LD (0-5cm)	573645	3340377	S4-LB(0-5cm)	579883	3288160
S2-LD roca	573645	3340377	S4-LB(25cm)	579883	3288160
S2-LE(0-5cm)	573743	3340447	S4-LB(40cm)	579883	3288160
S2-LE roca	573743	3340447	S4-LC(0-5cm)	579850	3287988
S2-RB (0-5cm)	573814	3340383	S4-LC(25cm)	579850	3287988
S2-RC (0-5cm)	573387	3340376	S4-LC(50cm)	579850	3287988
S2-RC (25cm)	573387	3340376	S4-LD(0-5cm)	579738	3288158
S2-RC (50cm)	573387	3340376	S4-LD(25cm)	579738	3288158
S2-RD (0-5cm)	573852	3340354	S4-LD(50cm)	579738	3288158
S2-RD (25cm)	573852	3340354	S4-RB(0-5cm)	579888	3288161
S2-RD (50cm)	573852	3340354	S4-RB(30cm)	579888	3288161



Laboratorio Nacional de Geoquímica y Minerología
Universidad Nacional Autónoma de México
Geoquímica Ambiental



ID Campo	coordenadas		ID Campo	coordenadas	
	X	Y		X	Y
S4-RC(0-5cm)	580090	3288241	S6-RC(0-5cm)	572089	3260788
S4-RC(25cm)	580090	3288241	S6-RC(25cm)	572089	3260788
S4-RC(50cm)	580090	3288241	S6-RC(50cm)	572089	3260788
S4-RD(0-5cm)	580277	3288292	S6-RC(100cm)	572089	3260788
S4-RD(25cm)	580277	3288292	S6-RD(0-5cm)	572093	3260755
S4-RD(50cm)	580277	3288292	S6-RD(25cm)	572093	3260755
S5-RC(0-5cm)	584650	3266888	S6-RD(50cm)	572093	3260755
S5-A (0-5cm)	584637	3266909	S7-A (0-5cm)	557248	3255589
S5-LB (0-5cm)	584611	3266912	S7-A (5-25cm)	557248	3255589
S5-LB (25cm)	584611	3266912	S7-A (25-50cm)	557248	3255589
S5-LC (0-5cm)	584563	3266947	S7-A (50-100cm)	557248	3255589
S5-LC (25cm)	584563	3266947	S7-A (100-150cm)	557248	3255589
S5-LC (50cm)	584563	3266947	S7-A (150-200cm)	557248	3255589
S5-LD (0-5cm)	584571	3267008	S7-A (200-250cm)	557248	3255589
S5-LD (25cm)	584571	3267008	S7-A (250-290cm)	557248	3255589
S5-LD (50cm)	584571	3267008	S7-A (+290cm)	557248	3255589
S5-LE (0-5cm)	584550	3267094	S7-LB (0-5cm)	557241	3255627
S5-LE (25cm)	584550	3267094	S7-LB (5-25cm)	557241	3255627
S5-LE(50cm)	584550	3267094	S7-LB (25-50cm)	557241	3255627
S5-LE roca	584550	3267094	S7-LB (50-100cm)	557241	3255627
S5-RB (0-5cm)	584644	3266902	S7-LB (100-150cm)	557241	3255627
S5-RB (25cm)	584644	3266902	S7-LB (150-200cm)	557241	3255627
S5-RC roca	584650	3266888	S7-LB (200-250cm)	557241	3255627
S5-RD (0-5cm)	584590	3266876	S7-LB (250-300cm)	557241	3255627
S5-RD roca	584590	3266876	S7-LB (+300cm)	557241	3255627
S6-LB(0-5cm)	572106	3260832	S7-LC (0-5cm)	557238	3255640
S6-LB(25cm)	572106	3260832	S7-LC (5-25cm)	557238	3255640
S6-LB(50cm)	572106	3260832	S7-LC (25-50cm)	557238	3255640
S6-LB(100cm)	572106	3260832	S7-LC (50-100cm)	557238	3255640
S6-LC(0-5cm)	572111	3260849	S7-LC (100-150cm)	557238	3255640
S6-LC(25cm)	572111	3260849	S7-LC (+150cm)	557238	3255640
S6-LC(50cm)	572111	3260849	S7-RB (0-5cm)	557257	3255557
S6-LC(70cm)	572111	3260849	S7-RB (5-25cm)	557257	3255557
S6-LD(0-5cm)	572116	3260872	S7-RB (25-50cm)	557257	3255557
S6-LD(25cm)	572116	3260872	S7-RB (50-100cm)	557257	3255557
S6-LD(50cm)	572116	3260872	S7-RB (100-150cm)	557257	3255557
S6-LE(0-5cm)	572113	3260879	S7-RB (150-200cm)	557257	3255557
S6-LE(Roca)	572113	3260879	S7-RB (200-250cm)	557257	3255557
S6-RB(0-5cm)	572101	3260812	S7-RB (250-300cm)	557257	3255557
S6-RB(25cm)	572101	3260812	S7-RB (300-350cm)	557257	3255557
S6-RB(50cm)	572101	3260812	S7-RB (+350cm)	557257	3255557
S6-RB(80cm)	572101	3260812			



Laboratorio Nacional de Geoquímica y Minerología
Universidad Nacional Autónoma de México
Geoquímica Ambiental



ID Campo	coordenadas		ID Campo	coordenadas	
	X	Y		X	Y
S7-RC (0-5cm)	557261	3255549	S9-LB (0-5cm)	535163	3236312
S7-RC (5-25cm)	557261	3255549	S9-LB (5-25cm)	535163	3236312
S7-RC (25-50cm)	557261	3255549	S9-LB (25-50cm)	535163	3236312
S7-RC (50-100cm)	557261	3255549	S9-LB (50-100cm)	535163	3236312
S7-RC (100-150cm)	557261	3255549	S9-LB (100-150cm)	535163	3236312
S7-RC (+150cm)	557261	3255549	S9-LB (150-200cm)	535163	3236312
S8-A (0-5cm)	544516	3243647	S9-LB (200-250cm)	535163	3236312
S8-LB(0-5cm)	544508	3243652	S9-LB (250-300cm)	535163	3236312
S8-LB(25cm)	544508	3243652	S9-LC (0-5cm)	535161	3236322
S8-LB(40cm)	544508	3243652	S9-LC (5-25cm)	535161	3236322
S8-LC(0-5cm)	544504	3243667	S9-LC (25-50cm)	535161	3236322
S8-LC(25cm)	544504	3243667	S9-LC (50-100cm)	535161	3236322
S8-LC(50cm)	544504	3243667	S9-LC (100-150cm)	535161	3236322
S8-LC(100cm)	544504	3243667	S9-LC (150-200cm)	535161	3236322
S8-LC(150cm)	544504	3243667	S9-LD (0-5cm)	535151	3236383
S8-LD(0-5cm)	544479	3243742	S9-LD (5-25cm)	535151	3236383
S8-LD(25cm)	544479	3243742	S9-LD (25-50cm)	535151	3236383
S8-LD(50cm)	544479	3243742	S9-LD (50-100cm)	535151	3236383
S8-LD(100cm)	544479	3243742	S9-RB (0-5cm)	535174	3236228
S8-LD(120cm)	544479	3243742	S9-RB (5-25cm)	535174	3236228
S8-RB (0-5cm)	544527	3243627	S9-RB (25-50cm)	535174	3236228
S8-RB (5-30cm)	544527	3243627	S9-RB (50-100cm)	535174	3236228
S8-RB (30-45cm)	544527	3243627	S9-RB (100-150cm)	535174	3236228
S8-RB (45-70cm)	544527	3243627	S9-RB (150-200cm)	535174	3236228
S8-RC (0-5cm)	544531	3243614	S9-RB (200-260cm)	535174	3236228
S8-RC (5-25cm)	544531	3243614	S9-RC (0-5cm)	535176	3236220
S8-RC (25-50cm)	544531	3243614	S9-RC (5-25cm)	535176	3236220
S8-RC (50-100cm)	544531	3243614	S9-RC (25-50cm)	535176	3236220
S8-RC (+100cm)	544531	3243614	S9-RC (50-100cm)	535176	3236220
S9-A (0-5cm)	535169	3236270	S9-RC (100-150cm)	535176	3236220
S9-A (5-25cm)	535169	3236270	S9-RC (150-200cm)	535176	3236220
S9-A (25-50cm)	535169	3236270	S9-RD (0-5cm)	535190	3236160
S9-A (50-100cm)	535169	3236270	S9-RD (5-25cm)	535190	3236160
S9-A (100-150cm)	535169	3236270	S9-RD (25-50cm)	535190	3236160
S9-A (150-200cm)	535169	3236270	S9-RD (50-100cm)	535190	3236160
S9-A (200-250cm)	535169	3236270			



Resultados de pH y CE:

ID Campo	pH	CE ($\mu\text{S/cm}$)	ID Campo	pH	CE ($\mu\text{S/cm}$)
S1-A (0-5cm)	8.85	38.1	S3-LC (0-5cm)	7.94	47.1
S1-LB (0-5cm)	8.66	50.3	S3-LC (25cm)	7.82	35.5
S1-LC (5cm)	9.08	64	S3-LC (50cm)	7.065	36.5
S1-LC (25cm)	9.11	54.1	S3-LD (0-5cm)	7.81	103.3
S1-LD (5cm)	8.42	97.3	S3-LD (25cm)	7.92	48.3
S1-LD (25cm)	7.92	141.65	S3-LD (50cm)	7.8	45.3
S1-LD (50cm)	8.84	126.6	S3-LE (0-5cm)	7.05	58
S1-RB (0-5cm)	9.06	49.4	S3-LE (25cm)	5.84	203
S1-RB (0-5cm)	8.61	38.7	S3-LE (50cm)	6.91	20.9
S1-RB (25cm)	9.04	35	S3-RB (0-5cm)	8.37	122.9
S1-RB (50cm)	9.28	38	S3-RB (25cm)	8.5	137.3
S1-RC (0-5cm)	8.78	35.9	S3-RC (0-5cm)	8.34	121.4
S1-RC (25cm)	8.86	60.1	S3-RC (25cm)	8.53	180.8
S1-RC roca	9.15	67.9	S3-RC (50cm)	8.24	253
S1-RD (0-5cm)	7.24	22.1	S3-RD (0-5cm)	6.55	95.8
S1-RE (0-5cm)	8.12	91.3	S3-RD (25cm)	5.95	347
S2-A (0-5cm)	9.28	55.8	S3-RD (50cm)	6.36	99.9
S2-LB (0-5cm)	8.86	59.1	S4-LB(0-5cm)	8.91	59.4
S2-LB (25cm)	9.4	67.9	S4-LB(25cm)	8.62	59.6
S2-LC (0-5cm)	8.58	129.5	S4-LB(40cm)	8.61	64.9
S2-LC (25cm)	8.65	42.3	S4-LC(0-5cm)	8.31	91.8
S2-LC (50cm)	8.45	57.5	S4-LC(25cm)	8.15	49.6
S2-LC roca	8.32	68.9	S4-LC(50cm)	7.68	57.8
S2-LD (0-5cm)	6.73	14.96	S4-LD(0-5cm)	7.7	165.8
S2-LD roca	5.48	15.66	S4-LD(25cm)	7.63	198
S2-LE(0-5cm)	7.45	41.8	S4-LD(50cm)	8.85	68.2
S2-LE roca	8.77	130.8	S4-RB(0-5cm)	8.04	71.9
S2-RB (0-5cm)	9.19	49	S4-RB(30cm)	8.46	74.8
S2-RC (0-5cm)	8.36	33.5	S4-RC(0-5cm)	8.54	55.6
S2-RC (25cm)	8.92	36.9	S4-RC(25cm)	8.15	52.4
S2-RC (50cm)	8.41	68.6	S4-RC(50cm)	8.34	37.4
S2-RD (0-5cm)	9.05	45.1	S4-RD(0-5cm)	7.85	225
S2-RD (25cm)	8.34	96.1	S4-RD(25cm)	8.64	113.9
S2-RD (50cm)	8.62	102.8	S4-RD(50cm)	8.64	149.2
S2-RE (0-5cm)	8.28	141.8	S5-RC(0-5cm)	7.94	89.8
S2-RE (25cm)	9	53.1	S5-A (0-5cm)	8.05	90.5
S2-RE (50cm)	8.68	111.6	S5-LB (0-5cm)	8.25	109.7
S3-A (0-5cm)	8.2	102.3	S5-LB (25cm)	8.09	118
S3-LB (0-5cm)	8.05	57.9	S5-LC (0-5cm)	8.26	69.9
S3-LB (25cm)	9.02	45.3	S5-LC (25cm)	7.72	31.5
			S5-LC (50cm)	7.82	54.7



Laboratorio Nacional de Geoquímica y Minerología
Universidad Nacional Autónoma de México
Geoquímica Ambiental



ID Campo	pH	CE ($\mu\text{S}/\text{cm}$)	ID Campo	pH	CE ($\mu\text{S}/\text{cm}$)
S5-LD (0-5cm)	7.11	33.40	S7-A (150-200cm)	8.78	61.1
S5-LD (25cm)	7.96	95.8	S7-A (200-250cm)	8.4	32.7
S5-LD (50cm)	8.1	42.7	S7-A (250-290cm)	8.05	18.8
S5-LE (0-5cm)	7.57	81	S7-A (+290cm)	7.67	24
S5-LE (25cm)	7.81	132.3	S7-LB (0-5cm)	8.75	37.8
S5-LE(50cm)	8.66	82.1	S7-LB (5-25cm)	8.22	49.5
S5-LE roca	7.26	17.35	S7-LB (25-50cm)	7.91	52.3
S5-RB (0-5cm)	8.54	147.3	S7-LB (50-100cm)	8.24	51.6
S5-RB (25cm)	8.69	121.1	S7-LB (100-150cm)	8.21	29.8
S5-RC roca	7.21	36.8	S7-LB (150-200cm)	8.09	32.6
S5-RD (0-5cm)	5.97	176.2	S7-LB (200-250cm)	7.84	37.84
S5-RD roca	7.03	19	S7-LB (250-300cm)	7.95	18.55
S6-LB(0-5cm)	8.3	104.4	S7-LB (+300cm)	8.3	27.4
S6-LB(25cm)	8.68	46.9	S7-LC (0-5cm)	8.48	50.8
S6-LB(50cm)	8.46	12.3	S7-LC (5-25cm)	8.18	60.4
S6-LB(100cm)	8.37	56.8	S7-LC (25-50cm)	8.40	56.55
S6-LC(0-5cm)	8.35	31.4	S7-LC (50-100cm)	8.33	71.7
S6-LC(25cm)	8.62	33	S7-LC (100-150cm)	8.45	35.3
S6-LC(50cm)	8.3	41.8	S7-LC (+150cm)	8.91	56
S6-LC(70cm)	8.48	39.1	S7-RB (0-5cm)	8.63	42.2
S6-LD(0-5cm)	8.4	55.6	S7-RB (5-25cm)	8.37	31.4
S6-LD(25cm)	8.59	60.2	S7-RB (25-50cm)	8.23	31.7
S6-LD(50cm)	7.75	43.47	S7-RB (50-100cm)	8.2	28
S6-LE(0-5cm)	7.5	113.6	S7-RB (100-150cm)	8.1	27.5
S6-LE(Roca)	7.65	34.5	S7-RB (150-200cm)	8.46	29.3
S6-RB(0-5cm)	8.24	49.1	S7-RB (200-250cm)	7.93	19.13
S6-RB(25cm)	8.26	43	S7-RB (250-300cm)	8.25	29
S6-RB(50cm)	8.22	41.5	S7-RB (300-350cm)	8.05	24.4
S6-RB(80cm)	8.15	41.6	S7-RB (+350cm)	8.3	27.5
S6-RC(0-5cm)	7.77	78.4	S7-RC (0-5cm)	8.1	46
S6-RC(25cm)	8.02	60.3	S7-RC (5-25cm)	8.55	45.3
S6-RC(50cm)	8.03	73.7	S7-RC (25-50cm)	8.68	48.8
S6-RC(100cm)	8.18	33.5	S7-RC (50-100cm)	8.86	48.5
S6-RD(0-5cm)	8.17	106.6	S7-RC (100-150cm)	8.81	48.2
S6-RD(25cm)	7.93	42.2	S7-RC (+150cm)	8.95	59.7
S6-RD(50cm)	8.13	86.1	S8-A (0-5cm)	8.52	340
S7-A (0-5cm)	8.92	50.1	S8-LB(0-5cm)	8.01	771
S7-A (5-25cm)	8.69	48	S8-LB(25cm)	8.07	224
S7-A (25-50cm)	8.64	44.5	S8-LB(40cm)	8.17	249
S7-A (50-100cm)	8.73	44.5	S8-LC(0-5cm)	8.1	169
S7-A (100-150cm)	8.62	43.8	S8-LC(25cm)	8.23	68.9



**Laboratorio Nacional de Geoquímica y Minerología
Universidad Nacional Autónoma de México
Geoquímica Ambiental**



ID Campo	pH	CE ($\mu\text{S}/\text{cm}$)	ID Campo	pH	CE ($\mu\text{S}/\text{cm}$)
S8-LC(50cm)	8.21	62.8	S9-LB (200-250cm)	9.25	34
S8-LC(100cm)	7.12	39	S9-LB (250-300cm)	9.11	32.5
S8-LC(150cm)	8.07	47.35	S9-LC (0-5cm)	9.12	42.7
S8-LD(0-5cm)	7.97	31.1	S9-LC (5-25cm)	8.64	76.2
S8-LD(25cm)	8.48	33.8	S9-LC (25-50cm)	8.85	48.3
S8-LD(50cm)	8.48	50.4	S9-LC (50-100cm)	8.88	37.7
S8-LD(100cm)	8.63	110.4	S9-LC (100-150cm)	8.7	41.35
S8-LD(120cm)	9.32	178.2	S9-LC (150-200cm)	8.85	34.6
S8-RB (0-5cm)	8.7	83.1	S9-LD (0-5cm)	8.48	143.5
S8-RB (5-30cm)	8.53	68.9	S9-LD (5-25cm)	8.66	119.8
S8-RB (30-45cm)	8.22	263	S9-LD (25-50cm)	8.96	57.9
S8-RB (45-70cm)	8.6	87.8	S9-LD (50-100cm)	8.6	32.9
S8-RC (0-5cm)	8.22	193.3	S9-RB (0-5cm)	8.73	69.3
S8-RC (5-25cm)	7.93	134.3	S9-RB (5-25cm)	8.28	312
S8-RC (25-50cm)	8.13	78.95	S9-RB (25-50cm)	8.91	41.9
S8-RC (50-100cm)	8.28	58.1	S9-RB (50-100cm)	9.19	95.6
S8-RC (+100cm)	8.56	116.4	S9-RB (100-150cm)	8.82	40.5
S9-A (0-5cm)	8.85	57.2	S9-RB (150-200cm)	9.22	52
S9-A (5-25cm)	8.88	54	S9-RB (200-260cm)	8.68	51.8
S9-A (25-50cm)	9.13	53	S9-RC (0-5cm)	8.85	39.5
S9-A (50-100cm)	9.17	52.8	S9-RC (5-25cm)	8.69	128.7
S9-A (100-150cm)	9.01	46.3	S9-RC (25-50cm)	8.82	82.9
S9-A (150-200cm)	8.94	40.1	S9-RC (50-100cm)	9.08	46
S9-A (200-250cm)	8.94	36.1	S9-RC (100-150cm)	9.06	50.2
S9-LB (0-5cm)	8.96	61.3	S9-RC (150-200cm)	9.07	44.1
S9-LB (5-25cm)	9.18	34.1	S9-RD (0-5cm)	8.24	111.1
S9-LB (25-50cm)	9.03	43.4	S9-RD (5-25cm)	8.66	47.8
S9-LB (50-100cm)	8.82	32.9	S9-RD (25-50cm)	9.02	45.9
S9-LB (100-150cm)	8.88	34.2	S9-RD (50-100cm)	9.01	41.6
S9-LB (150-200cm)	9.16	34.1			



Resultados de FRX :

ID Campo	As		Ba		Cr		Cu	
	mg/Kg	% CV	mg/Kg	% CV	mg/Kg	% CV	mg/Kg	% CV
LD	5.00		30.00		10.00		9.00	
S1-A (0-5cm)	18.08	10.93	790.25	1.84	95.27	2.37	44.13	7.97
S1-LB (0-5cm)	16.60	6.44	730.44	0.68	95.31	2.69	38.28	9.08
S1-LC (5cm)	28.27	8.21	582.24	1.49	108.02	3.22	40.41	6.87
S1-LC (25cm)	29.32	9.62	589.45	4.58	95.94	11.24	40.58	3.82
S1-LD(5cm)	37.99	2.74	582.76	3.85	106.21	8.81	41.15	8.34
S1-LD(25cm)	31.46	5.64	576.48	3.82	108.10	6.44	52.21	2.06
S1-LD (50cm)	49.23	5.87	632.91	1.51	104.01	3.56	49.31	7.64
S1-RB (0-5cm)	14.42	8.81	660.28	1.88	114.78	3.56	40.71	2.23
S1-RB'(0-5cm)	16.82	4.52	752.43	1.53	108.41	5.29	49.80	13.33
S1-RB'(25cm)	16.87	9.15	741.91	2.15	102.01	5.17	51.98	6.82
S1-RB'(50cm)	16.45	3.97	745.24	1.91	118.27	2.38	52.47	4.50
S1-RC (0-5cm)	17.01	12.88	681.59	1.22	114.07	3.99	59.09	3.26
S1-RC (25cm)	20.58	3.63	678.11	1.70	131.56	5.62	58.44	2.11
S1-RC roca	10.11	15.08	674.91	2.71	109.64	4.56	42.04	3.23
S1-RD (0-5cm)	40.24	3.98	830.35	1.32	141.73	1.30	63.44	3.34
S1-RE (0-5cm)	18.81	5.40	613.55	1.82	138.98	3.25	59.28	1.57
S2-A (0-5cm)	17.68	4.11	765.77	1.69	104.42	5.74	41.68	2.05
S2-LB (0-5cm)	18.95	9.16	605.29	1.04	113.47	2.53	41.07	3.68
S2-LB (25cm)	19.46	7.86	736.67	1.58	131.57	7.64	45.12	12.61
S2-LC (0-5cm)	147.55	3.01	521.65	2.97	107.43	12.59	52.25	2.28
S2-LC (25cm)	42.79	2.12	663.95	1.39	131.11	2.91	59.60	2.42
S2-LC (50cm)	107.98	4.95	578.59	0.84	119.70	8.56	64.87	5.79
S2-LC roca	241.02	1.88	404.40	2.34	104.24	3.38	27.38	12.18
S2-LD (0-5cm)	351.24	1.08	236.68	2.25	96.10	9.23	30.51	10.06
S2-LD roca	247.08	0.84	63.39	13.18	89.74	3.65	18.27	17.41
S2-LE(0-5cm)	79.98	1.86	639.59	0.67	117.40	2.86	44.20	5.23
S2-LE roca	452.34	1.68	200.98	3.73	85.99	5.72	55.39	6.82
S2-RB (0-5cm)	19.19	4.53	697.50	2.29	106.09	4.02	39.01	16.48
S2-RC (0-5cm)	22.38	4.77	700.68	2.19	106.66	0.61	43.13	8.10
S2-RC (25cm)	20.12	3.52	491.16	4.12	117.71	3.92	38.79	4.70
S2-RC (50cm)	24.81	3.95	621.71	1.22	119.22	3.77	62.70	3.31
S2-RD (0-5cm)	22.06	2.77	678.34	2.74	121.94	10.09	55.32	2.37
S2-RD (25cm)	23.27	1.45	590.89	1.77	124.09	5.24	67.04	2.07
S2-RD (50cm)	23.57	2.55	607.53	1.84	119.55	6.06	62.56	4.95
S2-RE (0-5cm)	29.93	5.54	364.37	4.38	105.34	7.25	54.55	1.15
S2-RE (25cm)	23.47	5.01	635.48	1.32	124.39	2.01	52.64	5.40
S2-RE (50cm)	24.51	8.18	616.41	2.39	127.52	3.87	56.52	4.05



Laboratorio Nacional de Geoquímica y Minerología
Universidad Nacional Autónoma de México
Geoquímica Ambiental



ID Campo	Fe		Mn		Pb		Zn	
	%	% CV	mg/Kg	% CV	mg/Kg	% CV	mg/Kg	% CV
LD	0.10		40.00		6.00		7.00	
S1-A (0-5cm)	2.17	0.08	475.44	2.53	21.58	13.08	43.21	4.16
S1-LB (0-5cm)	1.76	0.28	450.17	3.37	19.74	2.65	40.73	4.03
S1-LC (5cm)	2.65	0.44	526.43	1.37	40.22	4.00	113.33	3.79
S1-LC (25cm)	2.44	0.15	617.60	1.23	43.99	8.24	140.49	1.04
S1-LD(5cm)	2.82	0.31	564.07	3.55	75.69	2.19	158.51	2.26
S1-LD(25cm)	2.83	0.54	628.39	1.61	58.09	1.80	119.35	2.91
S1-LD (50cm)	3.37	0.14	695.83	1.19	96.43	0.56	167.38	3.42
S1-RB (0-5cm)	1.98	0.38	418.72	4.45	21.38	2.36	44.28	4.97
S1-RB'(0-5cm)	2.26	0.52	502.15	5.71	23.95	8.05	48.55	8.88
S1-RB'(25cm)	2.30	0.39	534.44	3.05	23.30	2.62	49.94	1.94
S1-RB'(50cm)	2.39	0.26	532.90	2.74	20.94	5.88	52.56	4.09
S1-RC (0-5cm)	3.31	0.44	588.50	1.32	25.61	7.30	54.14	2.99
S1-RC (25cm)	3.56	0.21	660.05	4.30	24.68	3.32	54.70	4.05
S1-RC roca	2.79	0.23	737.34	2.26	13.52	19.85	47.60	7.71
S1-RD (0-5cm)	6.66	0.32	915.07	5.85	18.18	3.24	58.02	11.16
S1-RE (0-5cm)	3.37	0.35	825.23	2.29	40.42	5.75	127.17	1.35
S2-A (0-5cm)	2.73	0.48	478.87	4.64	22.97	3.27	41.71	8.48
S2-LB (0-5cm)	1.85	0.39	338.37	6.13	21.05	10.52	43.03	4.87
S2-LB (25cm)	2.85	0.31	517.66	3.67	23.24	2.04	51.56	4.76
S2-LC (0-5cm)	3.37	0.54	697.82	0.49	522.39	2.10	155.61	1.06
S2-LC (25cm)	2.89	0.46	637.20	2.08	96.72	1.40	76.56	1.08
S2-LC (50cm)	3.09	0.17	748.38	1.26	289.57	2.34	123.95	2.25
S2-LC roca	2.81	0.27	695.09	0.42	781.17	0.22	147.22	2.92
S2-LD (0-5cm)	2.53	0.16	278.51	9.39	811.28	0.43	93.98	3.83
S2-LD roca	1.23	0.62	173.83	10.22	1245.75	0.32	97.26	4.85
S2-LE(0-5cm)	3.17	0.35	1182.77	1.49	416.16	1.15	225.89	0.83
S2-LE roca	4.44	0.24	424.28	2.80	539.32	1.86	383.89	2.04
S2-RB (0-5cm)	1.97	0.25	406.48	2.57	27.54	0.78	43.46	4.26
S2-RC (0-5cm)	2.65	0.28	633.08	2.20	27.45	1.72	55.14	8.51
S2-RC (25cm)	2.14	0.31	421.42	2.00	24.61	5.84	52.16	4.43
S2-RC (50cm)	2.99	0.29	687.05	3.25	31.64	3.48	71.29	0.32
S2-RD (0-5cm)	2.87	0.10	522.60	2.75	24.48	4.94	60.40	3.57
S2-RD (25cm)	2.83	0.07	745.44	2.18	38.60	3.12	82.15	4.62
S2-RD (50cm)	2.89	0.31	652.64	2.86	33.92	3.05	72.40	4.81
S2-RE (0-5cm)	2.72	0.42	857.00	0.85	95.27	2.52	96.34	5.87
S2-RE (25cm)	3.05	0.40	563.57	5.63	31.96	2.66	64.53	1.74
S2-RE (50cm)	2.95	0.17	619.27	3.05	38.40	6.97	71.67	5.30

NA= No aplica

<LOD= Debajo del límite de detección.



Laboratorio Nacional de Geoquímica y Minerología
Universidad Nacional Autónoma de México
Geoquímica Ambiental



ID Campo	As		Ba		Cr		Cu	
	mg/Kg	% CV	mg/Kg	% CV	mg/Kg	% CV	mg/Kg	% CV
LD	5.00		30.00		10.00		9.00	
S3-A (0-5cm)	15.88	15.62	706.65	3.89	87.83	5.13	46.78	3.72
S3-LB (0-5cm)	16.89	2.94	769.95	3.05	83.38	2.54	46.53	2.71
S3-LB (25cm)	16.14	11.63	711.15	2.00	85.45	3.67	55.19	1.39
S3-LC (0-5cm)	15.92	9.28	767.68	4.34	87.88	3.23	62.60	1.93
S3-LC (25cm)	15.36	8.68	697.75	0.14	83.55	5.39	54.75	3.62
S3-LC (50cm)	17.53	9.91	680.31	4.26	91.09	3.18	53.35	5.24
S3-LD (0-5cm)	21.67	6.85	618.59	2.19	100.15	1.49	83.64	4.68
S3-LD (25cm)	14.45	2.34	741.94	4.26	90.30	3.02	72.14	1.64
S3-LD (50cm)	17.59	4.65	692.03	3.34	82.93	4.01	63.60	1.34
S3-LE (0-5cm)	7.54	3.48	581.49	1.27	78.57	4.94	38.64	3.48
S3-LE (25cm)	8.42	6.80	360.05	5.31	93.32	4.07	36.15	2.88
S3-LE (50cm)	9.95	15.17	301.38	7.40	89.39	7.90	43.24	4.02
S3-RB (0-5cm)	17.55	12.47	774.06	3.91	81.72	7.55	49.57	3.88
S3-RB (25cm)	19.64	8.25	597.85	1.04	87.51	1.26	52.99	2.56
S3-RC (0-5cm)	18.21	17.15	155.05	5.75	95.63	3.30	109.22	2.13
S3-RC (25cm)	21.83	8.88	382.25	2.78	97.50	0.89	83.39	3.66
S3-RC (50cm)	21.08	10.04	429.45	5.52	106.80	1.89	86.19	5.29
S3-RD (0-5cm)	12.22	2.49	397.52	2.71	95.75	4.12	46.06	4.64
S3-RD (25cm)	12.34	10.55	555.70	1.03	89.44	5.46	52.95	2.51
S3-RD (50cm)	13.16	7.74	218.22	8.21	91.95	3.56	62.30	1.36
S4-LB(0-5cm)	15.90	2.52	654.76	4.78	80.41	4.42	61.68	5.54
S4-LB(25cm)	25.36	6.84	227.70	5.60	95.73	2.69	56.72	5.79
S4-LB(40cm)	17.25	8.76	612.43	3.10	81.68	3.56	50.22	5.10
S4-LC(0-5cm)	19.99	10.44	294.89	3.34	94.83	4.18	69.84	2.12
S4-LC(25cm)	16.55	6.05	402.03	6.23	88.35	9.00	59.42	1.49
S4-LC(50cm)	23.75	9.26	232.14	4.48	95.83	3.05	83.06	4.38
S4-LD(0-5cm)	5.95	2.02	241.43	7.18	82.45	4.26	35.79	0.15
S4-LD(25cm)	<LOD	NA	284.22	3.41	83.00	4.12	33.88	2.46
S4-LD(50cm)	7.32	12.49	221.58	6.67	71.37	1.85	30.60	2.04
S4-RB(0-5cm)	16.58	7.12	84.14	10.33	86.86	3.34	71.83	1.40
S4-RB(30cm)	12.82	12.93	539.41	3.72	87.92	6.26	55.42	4.09
S4-RC(0-5cm)	40.91	1.76	549.56	1.01	95.52	3.34	97.39	1.81
S4-RC(25cm)	33.09	1.57	281.42	1.73	108.04	6.06	96.35	4.78
S4-RC(50cm)	18.23	7.37	388.44	3.46	77.71	2.40	64.27	6.52
S4-RD(0-5cm)	32.65	4.41	333.32	7.53	84.59	3.91	108.84	4.11
S4-RD(25cm)	40.95	4.43	<LOD	NA	84.99	8.50	127.58	3.04
S4-RD(50cm)	35.79	3.94	437.01	1.72	97.78	5.81	111.14	2.93
S5-RC(0-5cm)	18.19	2.30	344.83	1.51	112.48	1.82	88.55	4.45
S5-A (0-5cm)	7.53	6.03	664.06	0.54	80.40	6.39	38.13	2.92
S5-LB (0-5cm)	9.05	9.30	516.15	5.00	79.78	4.91	31.02	3.70
S5-LB (25cm)	8.04	15.43	576.27	2.10	80.50	3.05	41.31	3.82



Laboratorio Nacional de Geoquímica y Minerología
Universidad Nacional Autónoma de México
Geoquímica Ambiental



ID Campo	Fe		Mn		Pb		Zn	
	%	% CV	mg/Kg	% CV	mg/Kg	% CV	mg/Kg	% CV
LD	0.10		40.00		6.00		7.00	
S3-A (0-5cm)	1.45	0.39	308.52	2.54	19.78	9.77	47.68	5.76
S3-LB (0-5cm)	1.60	0.19	340.81	5.83	20.72	3.07	50.72	4.58
S3-LB (25cm)	1.85	0.10	372.91	6.74	21.93	8.56	48.97	7.32
S3-LC (0-5cm)	2.29	0.30	385.08	1.20	22.40	1.13	52.99	3.73
S3-LC (25cm)	1.96	1.00	362.89	7.70	24.32	8.44	49.95	5.37
S3-LC (50cm)	1.84	0.83	325.52	9.58	20.45	3.29	51.13	3.61
S3-LD (0-5cm)	2.94	0.51	509.63	3.15	28.52	5.94	73.56	4.78
S3-LD (25cm)	3.58	0.59	551.02	0.26	48.43	3.25	52.86	7.45
S3-LD (50cm)	2.43	0.62	397.58	4.59	22.37	5.85	49.76	3.73
S3-LE (0-5cm)	1.39	0.05	365.17	0.50	18.27	5.46	45.77	2.98
S3-LE (25cm)	1.71	0.27	489.23	0.25	15.05	5.36	34.52	0.74
S3-LE (50cm)	2.10	0.35	491.45	5.16	21.28	10.84	47.51	5.35
S3-RB (0-5cm)	1.89	1.05	427.44	2.93	21.79	8.89	54.91	0.96
S3-RB (25cm)	1.97	0.55	380.89	0.38	20.37	6.98	47.19	3.96
S3-RC (0-5cm)	3.25	0.32	711.18	2.64	38.93	10.83	97.39	3.43
S3-RC (25cm)	4.07	0.22	646.01	3.19	32.44	7.82	84.29	4.65
S3-RC (50cm)	3.27	0.69	611.45	3.72	32.51	2.00	87.07	3.22
S3-RD (0-5cm)	2.02	0.20	585.43	3.48	23.49	1.10	74.69	2.04
S3-RD (25cm)	2.29	0.30	700.51	3.36	25.54	7.96	77.17	3.21
S3-RD (50cm)	2.73	0.31	589.54	3.53	30.79	1.73	87.09	4.58
S4-LB(0-5cm)	2.47	0.80	473.96	9.69	23.92	2.32	63.72	2.60
S4-LB(25cm)	1.78	0.58	325.51	4.52	27.90	4.36	66.75	0.45
S4-LB(40cm)	1.33	0.64	277.58	4.01	22.87	4.90	56.13	4.45
S4-LC(0-5cm)	2.88	0.77	589.85	2.48	32.96	5.86	84.15	1.96
S4-LC(25cm)	2.82	0.49	524.57	1.17	29.80	1.37	75.40	6.83
S4-LC(50cm)	3.79	0.50	647.60	4.90	38.61	6.91	94.61	5.15
S4-LD(0-5cm)	1.10	0.08	336.93	6.90	21.06	14.22	36.71	6.40
S4-LD(25cm)	1.40	0.69	416.93	3.41	24.29	1.92	46.09	10.38
S4-LD(50cm)	1.33	0.19	417.87	4.22	21.03	9.40	46.27	3.00
S4-RB(0-5cm)	2.45	0.40	438.98	1.57	31.63	14.52	90.60	1.38
S4-RB(30cm)	2.18	0.30	421.90	3.12	24.12	3.50	65.18	2.20
S4-RC(0-5cm)	2.91	0.75	600.29	1.51	34.01	4.63	96.17	4.00
S4-RC(25cm)	3.82	0.22	611.20	2.69	35.08	2.00	89.26	4.13
S4-RC(50cm)	2.43	0.16	377.22	6.30	23.42	2.82	63.71	3.63
S4-RD(0-5cm)	3.02	0.58	742.18	2.74	46.51	3.91	119.89	2.26
S4-RD(25cm)	3.43	0.53	782.91	2.62	47.23	6.80	141.28	2.74
S4-RD(50cm)	3.31	0.42	801.21	0.72	44.32	5.57	122.78	0.34
S5-RC(0-5cm)	3.28	0.38	768.22	0.91	39.36	6.77	90.71	1.03
S5-A (0-5cm)	1.06	0.07	286.65	5.66	17.13	3.32	40.06	5.45
S5-LB (0-5cm)	0.97	0.87	209.19	7.12	17.83	7.01	36.79	2.48
S5-LB (25cm)	1.06	0.30	254.49	1.61	18.27	10.10	36.84	0.73



Laboratorio Nacional de Geoquímica y Minerología
Universidad Nacional Autónoma de México
Geoquímica Ambiental



ID Campo	As		Ba		Cr		Cu	
	mg/Kg	% CV	mg/Kg	% CV	mg/Kg	% CV	mg/Kg	% CV
LD	5.00		30.00		10.00		9.00	
S5-LC (0-5cm)	14.28	6.07	584.93	3.08	95.17	3.72	82.14	3.31
S5-LC (25cm)	8.20	14.43	727.03	2.35	77.33	5.65	55.62	2.13
S5-LC (50cm)	10.75	21.60	754.74	3.10	79.76	3.67	52.92	3.51
S5-LD (0-5cm)	13.77	5.34	631.43	1.80	92.25	6.87	60.48	6.23
S5-LD (25cm)	12.88	19.31	684.82	1.90	86.58	3.77	55.26	3.99
S5-LD (50cm)	25.15	8.78	553.34	4.29	118.33	7.58	106.03	3.09
S5-LE (0-5cm)	22.67	8.55	540.96	1.50	106.16	5.07	82.80	4.07
S5-LE (25cm)	23.73	3.39	525.89	5.82	90.90	11.44	89.41	4.39
S5-LE (50cm)	22.11	6.86	541.33	6.19	98.98	1.52	81.28	3.09
S5-LE roca	<LOD	NA	146.20	5.52	75.52	1.31	24.77	7.62
S5-RB (0-5cm)	10.41	8.84	636.96	2.88	73.97	2.13	35.93	10.82
S5-RB (25cm)	12.44	4.85	773.16	1.90	71.61	5.04	40.48	3.32
S5-RC roca	<LOD	NA	144.55	6.44	75.44	2.34	28.02	7.62
S5-RD (0-5cm)	<LOD	NA	200.30	2.37	90.10	10.82	314.46	0.14
S5-RD roca	<LOD	NA	221.52	6.55	74.50	1.62	36.89	4.45
S6-LB(0-5cm)	8.18	16.03	583.76	1.76	68.91	4.29	31.16	3.51
S6-LB(25cm)	7.83	19.01	653.00	0.81	74.03	1.10	36.10	3.96
S6-LB(50cm)	7.55	10.09	716.83	2.16	81.56	3.44	30.90	5.11
S6-LB(100cm)	8.49	12.78	744.24	1.78	74.14	3.42	39.01	7.23
S6-LC(0-5cm)	8.78	4.28	650.08	3.66	71.60	4.56	31.16	10.91
S6-LC(25cm)	<LOD	NA	691.43	2.20	86.27	5.23	29.64	2.35
S6-LC(50cm)	9.83	12.76	187.70	13.72	74.32	5.22	41.31	8.37
S6-LC(70cm)	7.43	18.14	582.22	1.43	85.94	3.75	32.90	2.57
S6-LD(0-5cm)	17.15	5.27	452.31	2.62	82.01	4.87	71.66	0.50
S6-LD(25cm)	16.06	5.73	618.75	4.69	93.46	4.90	63.32	3.77
S6-LD(50cm)	17.57	5.99	553.59	4.22	85.02	5.45	64.91	5.06
S6-LE(0-5cm)	7.25	0.39	226.46	1.85	91.06	4.18	42.17	7.73
S6-LE(Roca)	<LOD	NA	813.35	2.69	68.95	5.69	35.02	2.11
S6-RB(0-5cm)	9.26	7.73	679.30	4.23	72.76	6.13	30.10	7.29
S6-RB(25cm)	9.87	1.94	574.75	4.50	80.50	5.10	38.88	4.95
S6-RB(50cm)	7.41	3.85	616.42	2.58	80.12	2.16	32.27	7.18
S6-RB(80cm)	7.15	16.02	751.92	2.96	73.96	3.71	33.03	3.99
S6-RC(0-5cm)	14.53	11.30	478.82	5.66	90.37	5.41	71.22	1.94
S6-RC(25cm)	15.76	10.44	430.28	2.71	88.87	4.98	70.04	3.67
S6-RC(50cm)	16.82	10.35	476.92	4.71	85.26	0.93	64.20	2.21
S6-RC(100cm)	13.64	5.76	480.68	7.11	89.30	3.53	53.37	7.75

NA= No aplica

<LOD= Debajo del limite de detección.



Laboratorio Nacional de Geoquímica y Minerología
Universidad Nacional Autónoma de México
Geoquímica Ambiental



ID Campo	Fe		Mn		Pb		Zn	
	%	% CV	mg/Kg	% CV	mg/Kg	% CV	mg/Kg	% CV
LD	0.10		40.00		6.00		7.00	
S5-LC (0-5cm)	5.64	0.14	640.85	3.04	26.48	3.38	58.52	4.74
S5-LC (25cm)	1.76	0.73	303.32	3.64	21.17	4.42	43.48	3.49
S5-LC (50cm)	2.02	0.26	362.38	9.05	20.96	10.32	41.67	6.04
S5-LD (0-5cm)	2.68	0.35	444.93	4.39	19.58	10.47	50.62	5.24
S5-LD (25cm)	2.76	0.28	454.93	2.07	22.70	8.72	55.39	7.04
S5-LD (50cm)	6.18	1.94	818.39	3.20	34.86	4.62	81.85	4.75
S5-LE (0-5cm)	4.21	0.42	664.65	3.57	35.32	4.01	86.56	2.04
S5-LE (25cm)	3.99	1.03	655.54	3.25	33.49	3.36	83.13	2.90
S5-LE(50cm)	3.79	0.26	651.86	1.55	35.09	9.05	86.43	2.90
S5-LE roca	0.29	0.76	113.97	9.93	21.02	5.65	22.34	13.96
S5-RB (0-5cm)	1.03	0.26	331.36	5.20	15.25	4.39	39.50	7.16
S5-RB (25cm)	1.06	0.43	280.84	1.15	17.08	12.11	41.21	1.66
S5-RC roca	0.81	0.65	332.52	2.10	22.24	9.49	54.09	3.53
S5-RD (0-5cm)	1.74	0.45	1018.83	3.07	34.47	5.75	130.94	2.30
S5-RD roca	1.13	0.09	479.11	1.85	16.34	4.32	74.80	1.77
S6-LB(0-5cm)	0.99	0.55	200.55	14.89	18.09	9.92	33.96	5.14
S6-LB(25cm)	0.92	0.38	199.33	2.46	14.98	9.11	29.18	8.48
S6-LB(50cm)	0.84	0.31	174.06	8.28	17.85	9.66	32.55	8.82
S6-LB(100cm)	1.14	0.35	234.86	7.00	16.81	4.49	30.86	10.61
S6-LC(0-5cm)	1.13	0.30	237.88	4.68	16.09	3.37	37.75	2.25
S6-LC(25cm)	0.89	0.21	209.83	3.13	18.21	7.79	33.29	2.60
S6-LC(50cm)	1.24	0.65	174.92	1.82	19.29	5.65	40.22	7.60
S6-LC(70cm)	1.00	0.94	212.82	3.85	16.55	15.32	30.30	10.58
S6-LD(0-5cm)	2.93	0.18	580.71	5.34	29.47	9.27	91.00	0.60
S6-LD(25cm)	2.92	0.43	541.18	4.89	27.33	3.42	72.82	3.31
S6-LD(50cm)	2.84	0.45	522.95	5.23	27.45	3.63	74.00	2.35
S6-LE(0-5cm)	2.93	0.17	784.51	2.95	26.03	6.75	113.83	1.81
S6-LE(Roca)	1.33	0.44	475.93	2.21	11.29	7.52	46.96	4.80
S6-RB(0-5cm)	1.17	0.35	225.61	4.51	17.14	12.02	38.16	5.93
S6-RB(25cm)	1.14	0.11	243.32	6.28	14.98	1.98	38.08	4.72
S6-RB(50cm)	1.21	0.63	229.96	4.58	16.56	7.10	37.10	8.08
S6-RB(80cm)	1.04	0.32	220.87	9.96	20.50	10.17	32.81	3.81
S6-RC(0-5cm)	2.85	0.64	531.55	5.15	27.45	6.41	76.77	1.18
S6-RC(25cm)	2.47	0.34	466.64	4.22	23.77	1.28	68.06	8.20
S6-RC(50cm)	2.62	0.37	604.79	0.91	27.86	4.94	81.22	5.74
S6-RC(100cm)	2.43	0.27	490.81	1.13	21.45	1.22	59.15	5.85

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Laboratorio Nacional de Geoquímica y Minerología
Universidad Nacional Autónoma de México
Geoquímica Ambiental



ID Campo	As		Ba		Cr		Cu	
	mg/Kg	% CV	mg/Kg	% CV	mg/Kg	% CV	mg/Kg	% CV
LD	5.00		30.00		10.00		9.00	
S6-RD(0-5cm)	12.60	18.45	382.81	4.12	81.84	5.76	58.16	2.07
S6-RD(25cm)	17.52	8.49	509.60	4.59	96.40	0.55	57.85	2.81
S6-RD(50cm)	18.04	10.58	475.08	6.34	90.05	6.39	62.21	3.38
S7-A (0-5cm)	8.67	4.18	720.10	2.67	87.00	1.02	41.37	4.02
S7-A (5-25cm)	7.17	3.21	750.42	1.31	73.72	2.70	27.45	1.17
S7-A (25-50cm)	8.20	19.34	657.29	2.85	74.87	0.85	25.40	2.61
S7-A (50-100cm)	11.29	7.16	813.02	2.51	76.49	1.61	33.12	2.89
S7-A (100-150cm)	6.78	11.30	612.27	0.75	82.57	0.79	32.03	3.66
S7-A (150-200cm)	10.76	18.91	625.37	2.62	85.08	3.36	45.36	6.06
S7-A (200-250cm)	7.98	11.73	681.22	2.60	92.57	4.20	33.38	1.92
S7-A (250-290cm)	11.00	2.58	773.19	2.66	81.68	6.12	32.06	5.41
S7-A (+290cm)	7.74	9.75	638.42	3.86	75.22	3.75	27.07	0.86
S7-LB (0-5cm)	10.73	8.44	578.09	6.18	93.04	2.73	63.15	3.19
S7-LB (5-25cm)	14.20	7.89	644.88	2.51	87.61	3.99	60.26	3.84
S7-LB (25-50cm)	11.63	11.80	629.58	1.86	89.42	5.34	53.29	4.90
S7-LB (50-100cm)	12.00	14.86	701.70	2.50	89.76	6.42	54.37	3.09
S7-LB (100-150cm)	11.58	2.58	743.29	0.72	90.90	2.72	44.53	2.50
S7-LB (150-200cm)	9.79	18.37	695.67	0.63	85.84	1.37	40.15	0.83
S7-LB (200-250cm)	12.31	9.68	568.39	9.18	87.11	2.52	54.64	2.51
S7-LB (250-300cm)	11.77	7.52	550.79	6.14	82.78	5.11	36.44	6.14
S7-LB (+300cm)	9.51	7.96	625.32	2.31	78.48	2.99	40.03	8.99
S7-LC (0-5cm)	14.77	6.41	559.63	4.11	88.08	2.43	59.26	3.69
S7-LC (5-25cm)	13.45	12.01	555.73	4.54	89.29	0.81	50.52	3.89
S7-LC (25-50cm)	12.32	11.28	479.65	6.33	92.43	1.94	63.10	0.53
S7-LC (50-100cm)	13.18	7.64	536.73	4.03	85.39	1.76	68.06	3.08
S7-LC (100-150cm)	13.98	4.47	634.25	3.42	92.44	2.93	57.43	5.58
S7-LC (+150cm)	9.38	12.43	689.58	3.82	85.37	0.55	35.60	4.80
S7-RB (0-5cm)	8.47	4.26	668.21	0.49	90.90	2.02	42.46	3.28
S7-RB (5-25cm)	8.87	5.50	669.65	2.97	77.70	1.41	31.45	1.95
S7-RB (25-50cm)	10.54	3.50	709.03	4.40	83.82	0.71	39.44	5.60
S7-RB (50-100cm)	8.35	8.11	782.77	3.20	80.40	4.50	41.80	4.42
S7-RB (100-150cm)	7.57	4.58	543.06	6.34	82.56	5.29	28.80	5.04
S7-RB (150-200cm)	11.60	3.89	713.52	2.41	88.43	5.29	40.04	1.51
S7-RB (200-250cm)	10.60	16.70	687.00	2.72	81.58	1.56	48.58	1.33
S7-RB (250-300cm)	8.30	6.89	762.75	3.19	77.92	3.23	30.00	5.86
S7-RB (300-350cm)	10.65	11.37	834.64	6.36	82.90	2.38	47.69	0.44
S7-RB (+350cm)	7.50	14.19	660.31	0.85	79.32	1.93	37.99	1.70

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Laboratorio Nacional de Geoquímica y Minerología
Universidad Nacional Autónoma de México
Geoquímica Ambiental



ID Campo	Fe		Mn		Pb		Zn	
	%	% CV	mg/Kg	% CV	mg/Kg	% CV	mg/Kg	% CV
LD	0.10		40.00		6.00		7.00	
S6-RD(0-5cm)	2.58	0.60	503.54	2.83	24.64	6.26	70.85	5.60
S6-RD(25cm)	2.81	0.53	498.72	0.95	28.66	7.56	73.78	5.29
S6-RD(50cm)	2.81	0.91	557.02	5.48	26.33	10.69	70.50	4.67
S7-A (0-5cm)	1.20	0.78	276.73	3.55	18.78	2.41	37.32	3.55
S7-A (5-25cm)	0.86	0.64	222.67	13.23	16.72	4.60	30.40	5.20
S7-A (25-50cm)	0.91	0.92	186.62	9.56	16.79	6.16	32.75	6.34
S7-A (50-100cm)	0.87	0.38	203.11	11.78	24.78	5.26	38.62	8.59
S7-A (100-150cm)	0.99	0.67	216.63	9.49	17.03	15.34	32.95	3.42
S7-A (150-200cm)	2.00	0.27	346.74	3.96	22.91	3.26	51.01	8.05
S7-A (200-250cm)	1.63	0.25	271.14	7.06	19.49	3.20	38.96	2.17
S7-A (250-290cm)	1.10	0.24	197.42	5.47	16.61	6.94	32.09	6.06
S7-A (+290cm)	0.80	0.25	165.15	9.31	14.33	7.99	31.24	4.78
S7-LB (0-5cm)	3.69	0.18	553.36	0.49	22.97	4.95	46.93	5.49
S7-LB (5-25cm)	2.54	0.51	487.14	3.02	22.10	4.36	66.80	0.74
S7-LB (25-50cm)	2.37	0.43	451.41	4.53	21.95	7.38	52.80	5.79
S7-LB (50-100cm)	2.75	0.64	462.09	3.02	20.04	14.37	51.15	4.66
S7-LB (100-150cm)	1.94	0.34	337.27	6.02	19.83	8.94	45.92	8.14
S7-LB (150-200cm)	1.48	0.30	293.78	5.32	17.22	12.18	41.67	7.51
S7-LB (200-250cm)	2.83	0.81	412.10	4.52	20.63	9.04	46.30	3.98
S7-LB (250-300cm)	1.83	0.94	233.04	5.68	17.31	9.62	37.91	6.59
S7-LB (+300cm)	1.62	0.06	245.18	5.56	16.56	3.46	41.52	7.46
S7-LC (0-5cm)	2.61	0.38	507.92	4.56	25.12	0.43	70.59	6.96
S7-LC (5-25cm)	2.50	0.10	426.96	0.68	24.43	4.16	60.02	2.10
S7-LC (25-50cm)	2.81	0.38	532.17	3.60	28.23	8.12	73.30	4.30
S7-LC (50-100cm)	2.71	0.27	588.99	3.37	25.52	1.97	74.27	3.27
S7-LC (100-150cm)	2.83	0.49	497.09	2.98	21.80	4.81	57.83	2.12
S7-LC (+150cm)	1.69	0.29	281.39	9.36	19.24	5.57	39.49	2.44
S7-RB (0-5cm)	1.79	0.29	355.52	4.21	21.10	3.44	43.69	7.15
S7-RB (5-25cm)	1.20	0.02	222.05	9.62	16.17	9.87	31.41	10.34
S7-RB (25-50cm)	1.72	0.67	296.43	5.11	17.40	2.85	39.00	2.35
S7-RB (50-100cm)	1.48	0.57	248.34	2.97	18.22	3.35	29.69	3.09
S7-RB (100-150cm)	0.93	0.26	172.93	1.94	17.25	4.07	27.64	5.76
S7-RB (150-200cm)	1.90	0.57	362.12	2.03	17.23	7.50	39.13	1.62
S7-RB (200-250cm)	2.18	0.27	349.09	4.63	18.35	9.97	46.26	7.21
S7-RB (250-300cm)	0.98	0.73	227.74	5.08	16.27	6.23	33.84	2.93
S7-RB (300-350cm)	1.94	0.12	333.50	5.06	16.87	2.83	65.06	7.68
S7-RB (+350cm)	1.33	0.24	210.68	5.59	16.53	8.59	36.93	9.21

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Laboratorio Nacional de Geoquímica y Minerología
Universidad Nacional Autónoma de México
Geoquímica Ambiental



ID Campo	As		Ba		Cr		Cu	
	mg/Kg	% CV	mg/Kg	% CV	mg/Kg	% CV	mg/Kg	% CV
LD	5.00		30.00		10.00		9.00	
S7-RC (0-5cm)	15.11	2.56	595.52	2.40	91.46	2.39	60.50	5.14
S7-RC (5-25cm)	15.27	12.97	670.59	0.95	90.38	3.19	67.24	2.50
S7-RC (25-50cm)	10.88	5.89	509.49	5.61	95.90	1.53	52.28	1.12
S7-RC (50-100cm)	12.14	2.48	704.83	1.39	82.03	7.42	55.28	2.41
S7-RC (100-150cm)	45.76	0.90	628.06	6.08	78.61	1.70	58.41	2.72
S7-RC (+150cm)	13.06	8.37	676.23	2.84	94.15	7.77	59.42	3.33
S8-A (0-5cm)	8.28	12.81	583.31	5.21	72.71	4.46	42.05	5.19
S8-LB(0-5cm)	8.58	11.26	568.66	6.67	87.68	2.10	41.81	4.51
S8-LB(25cm)	7.40	16.24	457.00	5.45	94.23	3.86	41.72	5.00
S8-LB(40cm)	11.26	1.16	453.79	5.19	83.37	2.37	58.74	3.44
S8-LC(0-5cm)	13.26	4.29	393.87	2.42	77.71	4.44	57.43	1.49
S8-LC(25cm)	22.18	2.23	360.58	14.06	81.71	4.53	69.95	1.24
S8-LC(50cm)	14.06	12.02	470.36	5.84	83.84	4.93	54.46	6.14
S8-LC(100cm)	11.28	5.14	693.29	1.49	76.94	4.21	47.85	2.78
S8-LC(150cm)	10.32	9.30	627.17	1.15	73.00	3.81	41.39	5.89
S8-LD(0-5cm)	11.37	7.29	732.01	1.81	70.79	2.92	44.11	1.19
S8-LD(25cm)	13.57	11.64	507.11	4.26	98.26	3.47	63.42	5.96
S8-LD(50cm)	18.59	6.06	388.64	4.07	93.98	0.48	64.35	3.69
S8-LD(100cm)	14.30	7.02	587.64	4.84	80.77	3.22	48.32	6.21
S8-LD(120cm)	19.95	5.77	484.77	4.57	89.07	6.93	63.66	4.07
S8-RB (0-5cm)	9.15	12.76	579.00	0.83	79.46	1.17	37.68	6.73
S8-RB (5-30cm)	7.59	11.90	548.32	3.35	77.80	3.20	29.25	5.30
S8-RB (30-45cm)	15.66	14.69	558.62	2.33	76.75	3.98	40.82	9.45
S8-RB (45-70cm)	6.66	7.54	768.62	4.24	77.29	0.68	32.81	2.26
S8-RC (0-5cm)	17.73	7.96	230.97	6.96	84.69	8.38	78.09	1.60
S8-RC (5-25cm)	15.24	15.12	310.85	3.05	86.73	2.34	52.81	1.85
S8-RC (25-50cm)	10.62	12.80	483.48	2.40	88.77	2.90	44.62	5.87
S8-RC (50-100cm)	14.21	8.41	597.09	3.63	79.43	5.06	51.75	4.06
S8-RC (+100cm)	13.75	13.16	485.84	4.55	92.17	4.21	63.53	2.40
S9-A (0-5cm)	9.65	8.20	638.46	2.82	83.77	4.26	33.43	5.46
S9-A (5-25cm)	7.35	15.38	772.53	0.85	76.95	4.23	33.21	2.27
S9-A (25-50cm)	6.78	8.37	683.28	3.24	75.09	2.63	36.22	8.79
S9-A (50-100cm)	8.15	9.74	643.41	1.01	75.39	5.07	31.80	3.08
S9-A (100-150cm)	8.80	13.22	621.41	0.52	73.34	4.82	29.74	9.49
S9-A (150-200cm)	8.97	8.15	621.85	2.27	78.31	3.69	36.05	4.37
S9-A (200-250cm)	9.61	17.12	762.08	1.82	73.01	1.48	30.95	4.57
S9-LB (0-5cm)	16.94	2.51	562.37	3.23	91.55	2.58	61.80	0.56
S9-LB (5-25cm)	7.09	3.72	746.03	3.34	72.49	4.21	33.14	8.84
S9-LB (25-50cm)	6.57	14.97	795.74	2.41	75.29	5.88	39.55	4.60
S9-LB (50-100cm)	10.83	6.08	708.92	2.72	73.36	8.17	48.19	6.95
S9-LB (100-150cm)	9.55	1.70	752.24	3.36	85.75	5.34	42.90	3.96



Laboratorio Nacional de Geoquímica y Minerología
Universidad Nacional Autónoma de México
Geoquímica Ambiental



ID Campo	Fe		Mn		Pb		Zn	
	%	% CV	mg/Kg	% CV	mg/Kg	% CV	mg/Kg	% CV
LD	0.10		40.00		6.00		7.00	
S7-RC (0-5cm)	2.79	0.30	503.79	2.51	24.48	2.42	60.91	5.36
S7-RC (5-25cm)	2.51	0.75	470.39	3.73	23.42	7.18	58.62	4.87
S7-RC (25-50cm)	2.40	0.47	415.68	4.98	20.98	10.08	53.39	5.76
S7-RC (50-100cm)	2.56	0.26	471.97	0.79	23.77	2.82	55.01	2.13
S7-RC (100-150cm)	2.51	0.10	436.54	6.44	21.87	7.12	58.78	1.22
S7-RC (+150cm)	2.89	0.52	517.99	5.95	23.80	6.44	62.51	3.35
S8-A (0-5cm)	0.97	0.54	263.39	3.74	16.97	10.47	35.31	6.40
S8-LB(0-5cm)	1.98	0.25	349.62	8.56	18.47	8.51	35.01	4.17
S8-LB(25cm)	1.61	0.85	165.95	6.99	19.38	6.90	39.88	7.80
S8-LB(40cm)	2.57	0.28	367.41	2.31	21.37	1.37	52.04	3.25
S8-LC(0-5cm)	2.06	0.16	430.15	7.82	25.44	6.03	72.09	4.29
S8-LC(25cm)	3.55	0.20	547.27	5.24	26.89	4.48	72.47	6.14
S8-LC(50cm)	2.20	0.25	361.92	4.38	20.51	7.52	60.02	2.05
S8-LC(100cm)	1.63	0.27	318.30	1.02	18.52	3.91	46.48	4.47
S8-LC(150cm)	1.80	0.39	309.47	4.21	15.65	5.27	40.13	10.93
S8-LD(0-5cm)	1.86	0.78	409.56	4.97	19.80	3.78	45.53	2.58
S8-LD(25cm)	3.64	0.07	477.32	3.99	25.06	7.19	53.77	9.12
S8-LD(50cm)	2.38	0.35	569.82	4.38	27.81	1.38	76.07	4.32
S8-LD(100cm)	2.18	0.23	470.97	4.08	23.77	8.48	57.37	4.23
S8-LD(120cm)	2.63	0.17	486.84	2.74	26.63	4.26	77.27	4.74
S8-RB (0-5cm)	0.87	0.36	226.85	9.41	16.96	2.34	34.58	2.95
S8-RB (5-30cm)	0.88	0.94	202.52	6.19	19.33	4.34	36.54	4.40
S8-RB (30-45cm)	1.54	0.48	427.88	4.59	26.55	9.25	47.85	10.58
S8-RB (45-70cm)	0.87	0.28	179.05	16.91	16.71	7.41	31.57	12.27
S8-RC (0-5cm)	2.41	0.72	599.24	1.88	32.15	3.45	85.14	1.07
S8-RC (5-25cm)	2.17	0.15	513.87	5.68	29.50	8.58	71.19	6.44
S8-RC (25-50cm)	1.91	0.49	451.99	3.70	27.84	3.02	62.95	2.04
S8-RC (50-100cm)	2.12	0.55	405.10	3.48	24.87	10.87	50.03	8.66
S8-RC (+100cm)	2.26	0.45	553.74	3.11	29.92	10.49	70.87	3.01
S9-A (0-5cm)	1.27	0.50	243.87	5.14	18.02	4.20	37.71	3.06
S9-A (5-25cm)	1.17	0.26	277.35	5.69	16.53	7.11	38.03	3.94
S9-A (25-50cm)	1.04	0.64	200.38	15.53	17.77	12.49	30.31	4.31
S9-A (50-100cm)	1.06	0.93	252.15	1.91	19.02	6.13	31.77	8.30
S9-A (100-150cm)	1.06	0.37	187.13	13.32	17.84	5.05	31.36	10.91
S9-A (150-200cm)	1.67	0.53	306.68	1.38	20.53	3.42	37.32	10.57
S9-A (200-250cm)	0.97	0.40	229.48	10.84	17.52	1.86	37.16	4.59
S9-LB (0-5cm)	2.28	0.28	562.66	2.84	26.85	3.69	65.12	3.31
S9-LB (5-25cm)	1.05	0.21	229.30	4.36	17.92	3.12	34.87	4.47
S9-LB (25-50cm)	1.66	0.42	312.21	4.94	18.22	9.99	40.30	3.94
S9-LB (50-100cm)	1.69	0.41	308.25	4.74	16.51	6.75	39.55	3.03
S9-LB (100-150cm)	1.45	0.45	265.44	11.55	16.86	3.35	36.76	10.18



Laboratorio Nacional de Geoquímica y Minerología
Universidad Nacional Autónoma de México
Geoquímica Ambiental



ID Campo	As		Ba		Cr		Cu	
	mg/Kg	% CV	mg/Kg	% CV	mg/Kg	% CV	mg/Kg	% CV
LD	5.00		30.00		10.00		9.00	
S9-LB (150-200cm)	<LOD	NA	606.93	2.93	78.98	3.99	34.29	0.93
S9-LB (200-250cm)	9.10	17.27	704.44	3.08	77.81	3.34	31.49	0.29
S9-LB (250-300cm)	8.92	19.24	725.66	3.84	66.46	0.71	34.42	4.46
S9-LC (0-5cm)	12.65	5.56	649.25	3.97	80.07	1.80	56.71	3.74
S9-LC (5-25cm)	8.40	17.83	578.01	1.94	70.68	5.31	48.29	1.90
S9-LC (25-50cm)	11.60	15.53	652.46	2.61	85.75	5.22	60.32	3.95
S9-LC (50-100cm)	11.66	13.63	655.05	2.83	83.56	4.14	53.44	4.08
S9-LC (100-150cm)	11.38	2.80	777.90	4.53	74.00	6.41	39.72	6.27
S9-LC (150-200cm)	9.12	12.60	631.26	1.45	69.47	0.89	27.51	1.72
S9-LD (0-5cm)	17.50	8.37	503.87	2.08	92.68	2.70	83.00	3.22
S9-LD (5-25cm)	14.55	11.10	583.51	2.08	84.81	3.65	62.88	1.15
S9-LD (25-50cm)	15.89	10.08	508.94	4.17	82.80	2.88	62.49	3.65
S9-LD (50-100cm)	10.94	14.16	668.38	1.49	76.72	3.89	46.33	4.56
S9-RB (0-5cm)	16.58	8.09	508.21	6.12	88.20	1.11	69.50	4.75
S9-RB (5-25cm)	28.72	2.72	394.75	3.23	81.66	1.35	114.61	3.68
S9-RB (25-50cm)	8.05	11.78	647.48	1.38	77.76	3.44	47.66	2.42
S9-RB (50-100cm)	12.82	11.51	550.72	1.71	83.85	2.00	56.64	2.26
S9-RB (100-150cm)	8.84	6.93	595.06	0.29	82.46	4.04	36.60	2.36
S9-RB (150-200cm)	6.05	8.00	638.33	3.87	72.28	3.01	34.69	3.65
S9-RB (200-260cm)	10.31	16.93	694.89	2.57	78.62	7.30	46.20	3.25
S9-RC (0-5cm)	9.52	8.35	599.98	6.12	80.49	2.88	49.90	3.01
S9-RC (5-25cm)	21.04	11.03	551.30	4.30	81.87	3.08	61.66	1.60
S9-RC (25-50cm)	15.98	12.70	529.34	6.22	101.49	7.57	64.81	3.37
S9-RC (50-100cm)	12.48	9.79	753.38	1.04	90.27	8.60	59.56	2.89
S9-RC (100-150cm)	15.24	1.77	718.39	1.07	80.15	4.79	59.68	3.86
S9-RC (150-200cm)	11.68	8.45	609.21	0.54	81.32	5.14	40.88	2.56
S9-RD (0-5cm)	17.41	12.77	415.21	2.43	87.59	3.04	77.45	2.96
S9-RD (5-25cm)	11.89	9.00	630.85	4.54	76.97	6.02	47.53	5.31
S9-RD (25-50cm)	12.47	2.53	694.34	2.67	85.03	6.18	58.26	2.32
S9-RD (50-100cm)	10.56	11.25	509.03	6.33	79.87	4.17	37.43	2.68

NA= No aplica

<LOD= Debajo del límite de detección.



Laboratorio Nacional de Geoquímica y Minerología
Universidad Nacional Autónoma de México
Geoquímica Ambiental



ID Campo	Fe		Mn		Pb		Zn	
	%	% CV	mg/Kg	% CV	mg/Kg	% CV	mg/Kg	% CV
LD	0.10		40.00		6.00		7.00	
S9-LB (150-200cm)	1.11	0.61	185.43	10.71	17.96	17.22	29.01	7.46
S9-LB (200-250cm)	0.99	0.89	195.94	0.85	16.16	6.61	30.26	5.74
S9-LB (250-300cm)	0.96	0.56	206.70	11.32	16.25	9.75	30.54	0.96
S9-LC (0-5cm)	2.52	0.34	450.04	5.56	19.23	4.73	51.87	6.67
S9-LC (5-25cm)	1.63	0.76	338.82	3.73	18.76	7.17	44.23	11.46
S9-LC (25-50cm)	2.36	0.23	445.82	3.82	22.26	1.53	50.31	5.02
S9-LC (50-100cm)	2.20	0.69	358.99	13.39	20.19	7.06	50.73	0.55
S9-LC (100-150cm)	1.45	0.78	269.39	5.61	17.86	9.27	40.62	6.98
S9-LC (150-200cm)	0.89	0.19	179.12	14.86	15.38	2.09	31.51	10.80
S9-LD (0-5cm)	2.55	0.38	599.78	2.92	33.76	4.85	85.29	7.79
S9-LD (5-25cm)	2.25	0.38	488.45	0.69	27.41	7.15	70.99	4.57
S9-LD (25-50cm)	2.15	0.38	478.70	1.46	27.79	2.80	73.21	2.08
S9-LD (50-100cm)	2.07	0.45	327.21	1.41	20.24	9.79	48.25	4.50
S9-RB (0-5cm)	2.15	0.42	554.01	3.61	28.76	6.02	73.16	8.01
S9-RB (5-25cm)	2.88	0.07	1129.35	3.06	50.51	4.12	125.35	5.78
S9-RB (25-50cm)	1.94	0.16	359.51	9.23	19.71	4.58	30.82	9.36
S9-RB (50-100cm)	2.45	0.30	384.13	4.05	22.41	0.27	55.33	5.61
S9-RB (100-150cm)	1.28	0.58	261.19	5.43	16.25	5.37	35.98	6.09
S9-RB (150-200cm)	0.98	0.41	155.69	5.14	18.08	4.40	31.90	3.09
S9-RB (200-260cm)	1.08	0.76	165.02	4.35	23.35	10.64	34.08	10.15
S9-RC (0-5cm)	1.72	0.28	301.31	5.54	18.42	2.85	43.35	4.10
S9-RC (5-25cm)	2.54	0.40	531.40	2.04	34.89	1.67	66.66	1.83
S9-RC (25-50cm)	2.59	0.19	477.70	5.10	25.30	4.64	65.63	4.45
S9-RC (50-100cm)	2.50	0.44	439.20	2.55	26.31	2.37	57.13	1.29
S9-RC (100-150cm)	2.22	0.55	476.12	2.28	23.85	7.78	59.78	7.64
S9-RC (150-200cm)	2.17	0.41	324.66	4.14	19.42	1.16	35.44	10.61
S9-RD (0-5cm)	2.66	0.43	610.21	2.22	35.18	2.80	84.69	3.64
S9-RD (5-25cm)	1.96	0.62	391.81	1.69	19.88	0.43	51.81	6.66
S9-RD (25-50cm)	2.30	0.58	447.98	5.33	21.58	8.39	57.21	5.21
S9-RD (50-100cm)	1.46	0.35	220.54	10.73	27.00	0.90	32.87	3.41

NA= No aplica

<LOD= Debajo del límite de detección.



CONTROL DE CALIDAD

pH y CE:

Para la precisión de los análisis de pH se determinaron algunas mediciones por duplicado reportando un %DPR de las mediciones (menor al 10%).

ID campo	pH	CE	%DPR pH	%DPR CE
S1-LC(5)	9.11	64.4	0.66	1.25
	9.05	63.6		
S1-LD(25)	8.03	141.3	2.65	0.49
	7.82	142		
S2-LB Aflor	8.74	129.8	0.80	1.53
	8.81	131.8		
S4-RD (25)	8.65	110.1	0.12	6.67
	8.64	117.7		
S7-LC (25-50)	8.39	58.1	0.36	5.48
	8.42	55		
S7-RC (5-25)	8.5	47.1	1.29	7.95
	8.61	43.5		
58-RC (25-50)	8.02	77	2.83	4.94
	8.25	80.9		

FRX:

Para la precisión de los análisis de FRX las mediciones se determinaron por triplicado, el valor reportado es el promedio de las tres determinaciones reportando también el % del coeficiente de variación (CV) de las mediciones (menor al 20%).

Para determinar la exactitud en FRX se utilizaron estándares certificados (TILL-4 y NIST-2710) como control analítico los cuales fueron analizados como muestra para determinar su concentración las concentraciones se encontraron entre el 80 y el 113% lo cual indica un buen desempeño del método de análisis.

Estándares	%Exactitud							
	As	Ba	Cu	Cr	Fe	Mn	Pb	Zn
TILL-4	98.33	99.53	95.28	121	83.37	80.87	99.98	NA
NIST-2710	113.8	NA	111.1	NA	113.32	108.98	100.14	114.4

Sin mas por al momento quedo a sus ordenes.



Laboratorio Nacional de Geoquímica y Minerología
Universidad Nacional Autónoma de México
Geoquímica Ambiental



Sin mas por al momento quedo a sus ordenes.

Analistas:

Responsable tecnico:

QFB. Fabiola Vega Garcia

M en C Luis Gerardo Martinez Jardines

M en C Alicia Santana Silva

QA. Daniel Ramos Pérez

Víctor Guillermo Montaño Jiménez



INFORME DE RESULTADOS

MOLINITO

Muestreo julio 2015

Información de las muestras

Se analizaron 132 muestras de suelos del Molinito.

Las muestras se recibieron preservadas e identificadas adecuadamente en bolsas de plástico de 25X10 cm, etiquetadas como M1 a la M16 con diferentes profundidades y claves adjunta A, RB y LB para cada una.

Información de los análisis

En el laboratorio de Geoquímica Ambiental las muestras fueron homogeneizadas y tamizadas por malla N° 10 para su análisis de pH, Conductividad eléctrica y FRX.

En las 132 muestras se determinaron los siguientes análisis:

El pH se determinó con un potenciómetro Hanna Instruments, HI-98185 y se siguió el método estandarizado 9045 de la US-EPA (1995).

La Conductividad eléctrica (CE) se determinó con un conductímetro OAKTON Con 700.

Fluorescencia de rayos X. El análisis se determinó con un equipo de Fluorescencia de Rayos X, NITON FXL 950 de Thermo Scientific. La determinación fue realizada por triplicado con un tiempo de medición de 90s en el modo de suelo y 31 s en el modo de mina para Fe. Los elementos cuantificados en cada determinación se reportan en mg/kg (ppm) para el modo de suelo y en g/100g suelo (%) para el modo de mina.



Listado de recepción de muestras:

ID Campo	coordenadas		ID Campo	coordenadas	
	X	Y		X	Y
M1-A (5cm)	531984	3237820	M4-LB (5cm)	528690	3236469
M1-A (25cm)	531984	3237820	M4-LB (25cm)	528690	3236469
M1-A (50cm)	531984	3237820	M4-LB (50cm)	528690	3236469
M1-LB (5cm)	531921	3237854	M4-RB (5cm)	528731	3236468
M1-LB (25cm)	531921	3237854	M4-RB (25cm)	528731	3236468
M1-LB (50cm)	531921	3237854	M4-RB (50cm)	528731	3236468
M1-LB Roca	531921	3237854	M7-A (5cm)	529706	3232296
M1-RB (5cm)	532034	3237804	M7-A (25cm)	529706	3232296
M1-RB (25cm)	532034	3237804	M7-A (40cm)	529706	3232296
M1-RB (50cm)	532034	3237804	M7-LB (5cm)	529716	3232290
M2-A (5cm)	531965	3236515	M7-LB (25cm)	529716	3232290
M2-A (25cm)	531965	3236515	M7-LB (40cm)	529716	3232290
M2-LB (5cm)	531953	3236547	M7-RB (5cm)	529712	3232356
M2-LB (25cm)	531953	3236547	M7-RB (25cm)	529712	3232356
M2-LB (50cm)	531953	3236547	M7-RB (60cm)	529712	3232356
M2-RB (5cm)	531944	3236498	M8-A (5cm)	530002	3232540
M2-RB (25cm)	531944	3236498	M8-A (25cm)	530002	3232540
M2-RB (50cm)	531944	3236498	M8-A (50cm)	530002	3232540
M3-A (5cm)	528349	3237112	M8-LB (5cm)	530008	3232526
M3-A (25cm)	528349	3237112	M8-LB (25cm)	530008	3232526
M3-A (50cm)	528349	3237112	M8-LB (50cm)	530008	3232526
M3-LB (5cm)	528303	3237112	M8-RB (5cm)	529996	3232546
M3-LB (25cm)	528303	3237112	M8-RB (25cm)	529996	3232546
M3-LB (50cm)	528303	3237112	M8-RB (50cm)	529996	3232546
M3-RB(5cm)	528360	3237124	M9-A (5cm)	530111	3232025
M3-RB (25cm)	528360	3237124	M9-A (25cm)	530111	3232025
M3-RB (50cm)	528360	3237124	M9-A (50cm)	530111	3232025
M4-A (5cm)	528726	3236470	M9-LB (5cm)	530117	3232020
M4-A (25cm)	528726	3236470	M9-LB (25cm)	530117	3232020
M4-A (50cm)	528726	3236470	M9-LB (50cm)	530117	3232020
M4-A (100cm)	528726	3236470			



Laboratorio Nacional de Geoquímica y Minerología
Universidad Nacional Autónoma de México
Geoquímica Ambiental



ID Campo	coordenadas		ID Campo	coordenadas	
	X	Y		X	Y
M9-RB (5cm)	530109	3232032	M13-LB (5cm)	533160	3231224
M9-RB (25cm)	530109	3232032	M13-LB (25cm)	533160	3231224
M9-RB (50cm)	530109	3232032	M13-LB (50cm)	533160	3231224
M10-A (5cm)	530132	3232330	M13-RB (5cm)	533160	3231224
M10-A (25cm)	530132	3232330	M13-RB (25cm)	533160	3231224
M10-A (50cm)	530132	3232330	M13-RB (50cm)	533160	3231224
M10-LB (5cm)	530143	3232319	M14-A (5cm)	530957	3232595
M10-LB (25cm)	530143	3232319	M14-A (25cm)	530957	3232595
M10-LB (50cm)	530143	3232319	M14-A (40cm)	530957	3232595
M10-RB (5cm)	530103	3232339	M14-LB (5cm)	530970	3232602
M10-RB (25cm)	530103	3232339	M14-LB (25cm)	530970	3232602
M10-RB (50cm)	530103	3232339	M14-LB (50cm)	530970	3232602
M11-A (5cm)	530117	3232020	M14-RB (5cm)	530939	3232589
M11-A (25cm)	530117	3232020	M14-RB (25cm)	530939	3232589
M11-A (50cm)	530117	3232020	M14-RB (50cm)	530939	3232589
M11-LB (5cm)	530704	3231898	M15-A (0-5cm)	534135	3231658
M11-LB (25cm)	530704	3231898	M15-A (5-25cm)	534135	3231658
M11-LB (50cm)	530704	3231898	M15-A (25-50cm)	534135	3231658
M11-RB (5cm)	530704	3231898	M15-A (+50cm)	534135	3231658
M11-RB (25cm)	530704	3231898	M15-A (roca)	534136	3231657
M11-RB (50cm)	530704	3231898	M15-LB (0-5cm)	534143	3231662
M12-A (5cm)	530220	3232492	M15-LB (5-25cm)	534143	3231662
M12-A (25cm)	530220	3232492	M15-LB (25-50cm)	534143	3231662
M12-A (50cm)	530220	3232492	M15-RB (0-5cm)	534125	3231653
M12-LB (5cm)	530220	3232492	M15-RB (5-25cm)	534125	3231653
M12-LB (25cm)	530220	3232492	M15-RB (25-50cm)	534125	3231653
M12-LB (50cm)	530220	3232492	M16-A (0-5cm)	532551	3232832
M12-RB (5cm)	530198	3232495	M16-A (5-25cm)	532551	3232832
M12-RB (25cm)	530198	3232495	M16-A (25-50cm)	532551	3232832
M12-RB (50cm)	530198	3232495	M16-LB (0-5cm)	532567	3232835
M13-A (5cm)	533160	3231224	M16-LB (5-25cm)	532567	3232835
M13-A (25cm)	533160	3231224	M16-LB (25-50cm)	532567	3232835
M13-A (40cm)	533160	3231224	M16-RB (0-5cm)	532543	3232824
			M16-RB (5-cm)	532543	3232824
			M16-RB (25-50cm)	532543	3232824



Resultados de pH y CE:

ID Campo	pH	CE ($\mu\text{S}/\text{cm}$)	ID Campo	pH	CE ($\mu\text{S}/\text{cm}$)
M1-A (5cm)	8.05	31.8	M4-RB (5cm)	8.63	73.1
M1-A (25cm)	8.6	59.7	M4-RB (25cm)	8.36	101.9
M1-A (50cm)	8.7	56.8	M4-RB (50cm)	8.28	86.3
M1-LB (5cm)	8.05	42.4	M7-A (5cm)	7.3	19.5
M1-LB (25cm)	8.69	56.2	M7-A (25cm)	7.16	20.6
M1-LB (50cm)	7.67	298	M7-A (40cm)	7.2	31.1
M1-LB Roca	7.68	56.9	M7-LB (5cm)	6.93	140.2
M1-RB (5cm)	8.43	46	M7-LB (25cm)	6.93	53.1
M1-RB (25cm)	8.22	49.7	M7-LB (40cm)	6.9	20
M1-RB (50cm)	8.18	41.5	M7-RB (5cm)	8.13	50.4
M2-A (5cm)	8.7	93.6	M7-RB (25cm)	8.37	43
M2-A (25cm)	8.57	43.7	M7-RB (60cm)	8.08	38.9
M2-LB (5cm)	7.96	203	M8-A (5cm)	7.32	49.7
M2-LB (25cm)	8.55	97.3	M8-A (25cm)	7.3	95
M2-LB (50cm)	8.7	50.6	M8-A (50cm)	7.65	42.7
M2-RB (5cm)	8.62	103.5	M8-LB (5cm)	7.75	61.2
M2-RB (25cm)	8.67	92.7	M8-LB (25cm)	7.85	34.5
M2-RB (50cm)	8.56	89.1	M8-LB (50cm)	8.19	44.2
M3-A (5cm)	6.9	31.1	M8-RB (5cm)	8.52	56.6
M3-A (25cm)	7.44	35.2	M8-RB (25cm)	8.75	45.2
M3-A (50cm)	7.7	41.5	M8-RB (50cm)	7.76	40
M3-LB (5cm)	8.38	126.7	M9-A (5cm)	7.43	27.7
M3-LB (25cm)	8.79	134.7	M9-A (25cm)	7.39	30.8
M3-LB (50cm)	8.02	244	M9-A (50cm)	7.19	30.1
M3-RB (5cm)	7.75	146.6	M9-LB (5cm)	7.43	30.8
M3-RB (25cm)	8.74	74	M9-LB (25cm)	8	24.6
M3-RB (50cm)	8.15	58.6	M9-LB (50cm)	7.58	36.5
M4-A (5cm)	8.39	30.7	M9-RB (5cm)	7.65	93.8
M4-A (25cm)	8.74	41.6	M9-RB (25cm)	8.21	81.1
M4-A (50cm)	8.01	35.4	M9-RB (50cm)	8.35	63.2
M4-A (100cm)	8.25	26.9	M10-A (5cm)	7.64	24.5
M4-LB (5cm)	8.75	50.2	M10-A (25cm)	7.51	21.6
M4-LB (25cm)	8.56	48.6	M10-A (50cm)	7.22	15.8
M4-LB (50cm)	8.98	28.9			



**Laboratorio Nacional de Geoquímica y Minerología
Universidad Nacional Autónoma de México
Geoquímica Ambiental**



ID Campo	pH	CE (µS/cm)	ID Campo	pH	CE (µS/cm)
M10-LB (5cm)	7.54	73.9	M14-A (5cm)	7.5	147.2
M10-LB (25cm)	8.18	65.6	M14-A (25cm)	7.79	356
M10-LB (50cm)	8.3	69.1	M14-A (40cm)	7.04	172.3
M10-RB(5cm)	7.35	69.3	M14-LB (5cm)	7.85	314
M10-RB (25cm)	7.89	57.8	M14-LB (25cm)	8.69	77.8
M10-RB (50cm)	8.27	60	M14-LB (50cm)	8.41	69.8
M11-A (5cm)	8.56	55.1	M14-RB (5cm)	7.57	386
M11-A (25cm)	7.97	78.3	M14-RB (25cm)	7.73	68.8
M11-A (50cm)	8.25	63.1	M14-RB (50cm)	8.25	80.2
M11-LB (5cm)	7.76	85.6	M15-A (0-5cm)	8.7	42
M11-LB (25cm)	8.74	69.5	M15-A (5-25cm)	8.49	44.9
M11-LB (50cm)	8.7	64.9	M15-A (25-50cm)	8.55	41.1
M11-RB (5cm)	8.54	113.8	M15-A (+50cm)	8.74	46.9
M11-RB (25cm)	8.8	75.9	M15-A (roca)	9.19	51.6
M11-RB (50cm)	8.38	100.8	M15-LB (0-5cm)	8.66	72.6
M12-A (5cm)	8.22	41.2	M15-LB (5-25cm)	8.67	69.5
M12-A (25cm)	8	34.4	M15-LB (25-50cm)	8.56	84
M12-A (50cm)	7.77	32.1	M15-RB (0-5cm)	8.83	72.3
M12-LB (5cm)	8.59	61.6	M15-RB (5-25cm)	8.54	79.1
M12-LB (25cm)	8.77	63.3	M15-RB (25-50cm)	8.68	352
M12-LB (50cm)	8.78	64	M16-A (0-5cm)	8.415	43.1
M12-RB (5cm)	8.25	152.4	M16-A (5-25cm)	8.55	39.9
M12-RB (25cm)	8.65	81.4	M16-A (25-50cm)	8.55	35.2
M12-RB (50cm)	8.68	102.4	M16-LB (0-5cm)	8.08	304
M13-A (5cm)	7.96	31.8	M16-LB (5-25cm)	8.27	111.5
M13-A (25cm)	8	72.4	M16-LB (25-50cm)	8.68	71.2
M13-A (40cm)	8.45	32.3	M16-RB (0-5cm)	8.24	125.5
M13-LB (5cm)	8.86	60.5	M16-RB (5-cm)	8.48	95.6
M13-LB (25cm)	8.75	58.8	M16-RB (25-50cm)	8.63	60.6
M13-LB (50cm)	8.5	70.4			
M13-RB (5cm)	8.4	55.5			
M13-RB (25cm)	8.69	71.7			
M13-RB (50cm)	8.75	83.2			



Resultados de FRX :

ID Campo	As		Ba		Cr		Cu	
	mg/Kg	% CV	mg/Kg	% CV	mg/Kg	% CV	mg/Kg	% CV
LD	5.00		30.00		10.00		9.00	
M1-A (5cm)	13.52	12.50	830.48	3.27	90.90	3.87	36.58	3.94
M1-A (25cm)	10.57	16.92	804.63	1.55	93.74	5.19	38.61	1.98
M1-A (50cm)	13.17	6.70	579.45	3.19	108.99	2.04	43.52	6.54
M1-LB (5cm)	<LOD	NA	903.93	3.56	91.61	3.79	61.56	3.86
M1-LB (25cm)	<LOD	NA	559.02	1.48	98.17	4.41	53.96	3.34
M1-LB (50cm)	<LOD	NA	610.77	1.20	86.57	2.70	57.52	3.86
M1-LB Roca	<LOD	NA	1113.78	2.04	76.54	2.10	62.06	3.35
M1-RB (5cm)	6.86	9.80	475.95	4.84	99.89	1.17	52.29	1.18
M1-RB (25cm)	5.62	2.90	663.23	2.25	97.89	1.94	50.76	2.88
M1-RB (50cm)	<LOD	NA	733.62	1.44	94.49	0.36	57.69	3.95
M2-A (5cm)	15.66	15.13	231.74	13.96	92.07	6.36	58.11	5.47
M2-A (25cm)	13.72	5.49	630.16	2.57	96.19	3.78	44.20	8.10
M2-LB (5cm)	12.07	10.90	524.68	2.96	110.02	0.61	39.61	4.51
M2-LB (25cm)	11.46	0.74	547.63	1.70	115.33	4.69	40.12	7.14
M2-LB (50cm)	13.72	5.15	431.33	1.73	122.78	4.91	48.83	0.34
M2-RB (5cm)	11.04	18.07	82.46	4.27	109.33	2.44	56.65	0.73
M2-RB (25cm)	9.93	16.88	457.80	3.71	101.68	2.80	46.22	2.82
M2-RB (50cm)	11.17	10.97	303.68	4.19	96.93	4.43	61.82	3.48
M3-A (5cm)	<LOD	NA	838.79	0.58	85.76	2.83	27.58	3.42
M3-A (25cm)	6.00	6.02	798.92	3.90	85.34	1.99	25.82	6.27
M3-A (50cm)	6.89	3.50	867.53	3.62	96.02	1.65	34.11	4.39
M3-LB (5cm)	6.23	0.58	346.66	5.66	109.24	6.65	45.33	4.25
M3-LB (25cm)	6.44	4.05	389.46	4.09	102.84	3.81	39.17	1.28
M3-LB (50cm)	7.96	9.69	405.12	9.34	101.41	0.72	49.82	2.81
M3-RB(5cm)	7.02	3.54	438.73	4.05	111.47	0.78	41.20	0.90
M3-RB (25cm)	8.80	5.69	476.65	5.63	95.35	1.82	39.96	4.74
M3-RB (50cm)	9.23	9.06	517.08	2.40	94.25	2.12	39.05	4.21

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Laboratorio Nacional de Geoquímica y Minerología
Universidad Nacional Autónoma de México
Geoquímica Ambiental



ID Campo	Fe		Mn		Pb		Zn	
	%	% CV	mg/Kg	% CV	mg/Kg	% CV	mg/Kg	% CV
LD	0.10		40.00		6.00		7.00	
M1-A (5cm)	1.42	0.08	409.85	1.11	22.75	5.53	38.00	4.08
M1-A (25cm)	1.45	0.31	417.75	3.81	18.41	4.93	38.37	8.28
M1-A (50cm)	1.93	0.29	443.18	2.63	19.47	2.86	49.19	6.09
M1-LB (5cm)	3.57	0.35	758.01	3.27	13.85	7.89	46.76	7.04
M1-LB (25cm)	2.50	0.24	547.28	3.16	13.51	5.55	50.10	6.24
M1-LB (50cm)	2.31	0.13	432.30	1.57	14.00	14.48	44.47	8.67
M1-LB Roca	2.49	0.55	537.92	5.29	11.18	12.44	59.16	2.84
M1-RB (5cm)	2.60	0.46	433.46	3.05	20.98	12.69	60.37	1.54
M1-RB (25cm)	2.49	0.63	490.25	1.92	13.94	6.54	54.58	4.85
M1-RB (50cm)	2.58	0.53	541.77	2.91	16.13	5.41	58.52	6.20
M2-A (5cm)	2.74	0.30	575.11	5.94	16.87	11.20	65.27	2.89
M2-A (25cm)	2.10	0.64	445.60	2.55	17.58	7.00	49.04	7.46
M2-LB (5cm)	1.89	0.57	449.89	2.38	21.79	4.43	57.94	5.29
M2-LB (25cm)	1.84	0.20	497.81	2.40	19.27	8.22	42.57	7.52
M2-LB (50cm)	2.42	0.31	475.51	7.32	22.53	9.72	51.21	8.42
M2-RB (5cm)	2.42	0.18	416.69	7.12	27.49	5.27	70.47	1.93
M2-RB (25cm)	1.95	0.17	364.85	4.91	18.41	7.57	41.66	4.61
M2-RB (50cm)	2.06	0.56	305.25	11.92	19.96	8.93	48.01	10.39
M3-A (5cm)	0.82	1.40	238.96	13.88	17.83	10.25	30.38	2.63
M3-A (25cm)	0.79	0.96	287.21	5.39	15.28	2.46	26.90	5.37
M3-A (50cm)	0.89	0.51	240.76	8.60	15.98	15.29	32.48	6.05
M3-LB (5cm)	2.26	0.61	502.36	7.24	21.10	10.41	62.13	4.04
M3-LB (25cm)	2.40	0.16	544.31	1.46	18.43	6.01	60.29	4.42
M3-LB (50cm)	2.46	0.32	572.80	6.14	21.29	4.03	67.59	6.14
M3-RB(5cm)	1.71	0.47	454.51	6.39	17.95	16.82	62.47	8.55
M3-RB (25cm)	1.95	0.55	398.13	2.58	17.56	11.85	46.39	6.18
M3-RB (50cm)	1.97	0.57	497.57	3.81	20.39	4.00	53.54	2.38

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Laboratorio Nacional de Geoquímica y Minerología
Universidad Nacional Autónoma de México
Geoquímica Ambiental



ID Campo	As		Ba		Cr		Cu	
	mg/Kg	% CV	mg/Kg	% CV	mg/Kg	% CV	mg/Kg	% CV
LD	5.00		30.00		10.00		9.00	
M4-A (5cm)	6.66	5.99	716.96	1.10	87.61	0.91	32.94	6.32
M4-A (25cm)	6.88	13.35	792.59	1.04	86.91	0.95	34.59	7.02
M4-A (50cm)	9.23	10.08	625.11	5.10	99.45	0.96	38.50	1.29
M4-A (100cm)	<LOD	NA	811.15	4.60	91.44	2.59	32.48	0.40
M4-LB (5cm)	<LOD	NA	566.27	2.76	88.81	1.07	23.13	2.59
M4-LB (25cm)	6.76	18.27	679.72	3.01	86.27	2.40	34.78	2.90
M4-LB (50cm)	6.78	9.67	625.44	4.86	87.07	4.60	34.94	4.97
M4-RB (5cm)	9.78	6.80	335.59	6.78	95.71	6.31	44.45	2.46
M4-RB (25cm)	10.47	5.35	488.78	2.06	90.13	3.39	50.40	1.85
M4-RB (50cm)	9.46	16.12	473.39	1.32	108.59	5.06	52.12	5.85
M7-A (5cm)	29.98	6.23	428.63	6.42	95.31	7.25	54.31	3.34
M7-A (25cm)	31.92	4.23	637.01	3.85	100.96	3.52	55.68	2.90
M7-A (40cm)	34.93	0.58	340.77	6.30	97.12	5.22	53.32	0.32
M7-LB (5cm)	33.86	5.94	524.32	7.52	95.42	4.52	43.57	5.64
M7-LB (25cm)	35.87	6.66	662.22	3.40	97.00	4.93	49.78	3.02
M7-LB (40cm)	41.06	3.51	318.39	3.81	95.89	3.88	49.43	3.06
M7-RB (5cm)	35.89	2.35	384.10	4.51	82.19	4.46	47.54	4.75
M7-RB (25cm)	43.48	1.26	790.17	2.48	74.19	5.96	55.85	5.14
M7-RB (60cm)	47.63	5.32	430.74	3.42	69.40	2.98	49.70	1.11
M8-A (5cm)	33.33	1.31	807.79	4.27	74.39	3.81	50.57	2.73
M8-A (25cm)	39.00	3.73	878.23	1.00	88.67	6.37	56.87	7.98
M8-A (50cm)	40.67	5.82	473.76	3.32	77.15	1.79	52.07	5.74
M8-LB (5cm)	29.62	3.40	485.85	6.88	74.78	6.75	56.51	2.59
M8-LB (25cm)	36.94	1.98	582.18	2.40	77.58	5.19	55.35	7.32
M8-LB (50cm)	35.00	1.23	411.28	2.80	90.08	2.82	52.64	4.17
M8-RB (5cm)	43.62	2.66	718.64	5.04	99.28	3.11	59.38	0.89
M8-RB (25cm)	45.02	4.69	600.40	2.71	94.74	5.16	52.45	4.24
M8-RB (50cm)	63.66	3.77	348.64	4.44	101.71	0.58	59.12	4.29
M9-A (5cm)	152.09	1.25	778.61	4.10	142.20	3.56	56.54	1.14
M9-A (25cm)	237.54	0.62	583.72	1.92	89.96	1.40	68.61	3.07
M9-A (50cm)	474.89	0.65	724.55	4.90	94.86	2.70	62.23	1.38
M9-LB (5cm)	66.18	4.13	823.73	1.51	74.81	1.05	55.42	3.11
M9-LB (25cm)	106.86	0.29	359.10	4.33	81.00	4.45	43.31	4.83
M9-LB (50cm)	130.78	2.00	325.99	4.35	86.10	5.78	42.17	2.91

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Laboratorio Nacional de Geoquímica y Minerología
Universidad Nacional Autónoma de México
Geoquímica Ambiental



ID Campo	Fe		Mn		Pb		Zn	
	%	% CV	mg/Kg	% CV	mg/Kg	% CV	mg/Kg	% CV
LD	0.10		40.00		6.00		7.00	
M4-A (5cm)	1.18	0.34	257.66	4.69	15.22	7.34	28.82	3.86
M4-A (25cm)	1.30	0.75	320.28	4.62	19.26	13.67	34.41	6.63
M4-A (50cm)	1.53	0.04	370.25	5.88	18.53	5.62	51.20	6.73
M4-A (100cm)	1.12	0.49	284.66	5.78	18.95	5.87	35.27	8.84
M4-LB (5cm)	1.53	1.00	316.68	8.14	17.72	5.77	38.55	2.59
M4-LB (25cm)	1.20	0.35	256.10	5.73	15.60	15.19	33.21	9.05
M4-LB (50cm)	1.18	0.41	229.92	7.15	15.93	5.60	31.35	3.87
M4-RB (5cm)	1.99	0.57	396.95	4.45	21.60	3.45	59.31	4.90
M4-RB (25cm)	2.30	0.50	519.53	3.57	26.48	2.27	64.75	0.88
M4-RB (50cm)	2.27	0.38	554.70	3.10	22.55	5.05	65.01	6.58
M7-A (5cm)	3.33	0.13	493.64	6.15	25.15	7.45	50.28	2.18
M7-A (25cm)	3.16	0.20	559.73	1.68	24.21	2.66	66.76	1.52
M7-A (40cm)	3.11	0.09	533.51	4.69	25.38	5.00	67.25	3.44
M7-LB (5cm)	2.80	0.40	444.71	2.87	29.07	3.00	65.06	1.90
M7-LB (25cm)	3.14	0.40	512.54	5.52	27.58	9.00	59.96	4.92
M7-LB (40cm)	3.09	0.37	466.43	4.21	26.18	5.96	59.43	2.66
M7-RB (5cm)	2.84	0.65	389.37	5.01	25.70	8.52	60.21	8.75
M7-RB (25cm)	2.94	0.40	565.35	2.83	22.08	12.42	63.63	3.10
M7-RB (60cm)	2.72	0.15	442.49	7.33	23.82	10.57	74.92	4.59
M8-A (5cm)	2.52	0.47	461.91	7.03	20.31	4.63	62.55	4.83
M8-A (25cm)	2.70	0.53	555.54	2.54	23.71	5.24	64.16	2.92
M8-A (50cm)	2.84	0.36	539.34	6.08	24.23	1.83	73.24	1.85
M8-LB (5cm)	3.04	0.20	425.58	9.66	19.89	9.46	49.69	6.01
M8-LB (25cm)	3.11	0.48	461.36	3.25	27.30	1.74	60.10	5.03
M8-LB (50cm)	3.29	0.38	613.18	5.11	31.84	6.87	63.82	2.08
M8-RB (5cm)	3.33	0.24	684.40	2.29	30.84	0.89	74.33	3.30
M8-RB (25cm)	3.74	0.32	648.96	2.21	32.48	1.27	65.28	2.47
M8-RB (50cm)	4.11	0.09	715.25	4.42	34.73	7.99	71.82	6.19
M9-A (5cm)	3.40	0.04	633.84	0.82	24.39	3.44	49.18	14.00
M9-A (25cm)	4.43	0.46	657.08	1.69	27.09	1.81	53.19	5.86
M9-A (50cm)	3.13	0.11	578.04	2.58	29.99	0.83	53.73	7.19
M9-LB (5cm)	2.71	0.22	516.66	5.71	19.18	5.22	44.05	5.91
M9-LB (25cm)	2.65	0.10	471.63	4.54	20.52	9.95	53.38	7.55
M9-LB (50cm)	2.53	0.21	431.88	5.10	22.98	9.59	52.68	5.54

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**Laboratorio Nacional de Geoquímica y Minerología
Universidad Nacional Autónoma de México
Geoquímica Ambiental**



ID Campo	As		Ba		Cr		Cu	
	mg/Kg	% CV	mg/Kg	% CV	mg/Kg	% CV	mg/Kg	% CV
LD	5.00		30.00		10.00		9.00	
M9-RB (5cm)	47.77	3.75	321.95	3.48	70.64	1.33	45.99	2.23
M9-RB (25cm)	43.42	1.71	663.89	2.42	78.33	6.02	45.06	2.91
M9-RB (50cm)	61.53	4.00	537.07	4.01	95.68	2.72	51.00	9.22
M10-A (5cm)	143.72	1.89	886.10	2.82	111.71	3.80	56.84	2.58
M10-A (25cm)	208.78	1.26	850.77	0.40	113.54	5.76	66.77	2.23
M10-A (50cm)	97.13	0.53	272.16	10.80	79.37	3.92	50.80	3.73
M10-LB (5cm)	83.66	0.96	508.44	2.69	82.13	7.77	60.78	3.99
M10-LB (25cm)	60.71	3.95	721.59	2.33	75.86	4.49	52.55	2.95
M10-LB (50cm)	57.25	2.64	355.42	1.58	83.89	0.80	58.40	7.51
M10-RB(5cm)	37.90	6.92	528.75	4.13	75.84	4.20	54.74	1.31
M10-RB (25cm)	34.97	7.34	711.10	2.67	79.88	6.17	52.30	2.53
M10-RB (50cm)	35.82	10.02	366.21	4.85	82.68	6.31	46.64	6.14
M11-A (5cm)	22.54	3.35	728.35	4.09	83.32	2.37	69.88	3.61
M11-A (25cm)	22.02	8.10	669.22	1.52	82.41	3.71	72.73	6.43
M11-A (50cm)	28.38	1.41	480.63	2.98	88.53	5.88	65.87	0.88
M11-LB (5cm)	26.96	6.27	475.23	3.71	93.90	3.07	68.45	2.19
M11-LB (25cm)	29.75	6.56	418.84	5.31	88.03	1.31	68.29	7.06
M11-LB (50cm)	22.81	0.98	488.51	8.14	86.88	5.87	63.39	6.47
M11-RB (5cm)	22.49	3.68	280.11	5.82	76.53	4.19	62.37	3.90
M11-RB (25cm)	28.47	7.73	264.01	6.58	83.10	10.22	66.62	0.58
M11-RB (50cm)	28.37	3.00	256.70	5.11	91.44	10.36	72.89	4.21
M12-A (5cm)	95.73	1.51	852.93	2.19	90.45	6.19	47.36	8.91
M12-A (25cm)	204.34	1.82	726.58	0.62	88.14	7.72	48.14	2.62
M12-A (50cm)	105.49	0.74	540.99	3.79	91.88	3.32	41.24	2.08
M12-LB (5cm)	28.83	3.18	489.95	2.88	88.00	6.87	62.36	2.53
M12-LB (25cm)	24.23	6.38	397.05	1.99	93.65	3.60	67.61	4.64
M12-LB (50cm)	30.69	4.75	403.06	5.74	97.56	3.15	54.59	6.39
M12-RB (5cm)	54.12	2.57	448.96	1.91	107.79	2.00	47.93	4.33
M12-RB (25cm)	59.76	2.39	648.92	1.36	87.99	4.16	55.49	5.63
M12-RB (50cm)	73.35	1.72	564.53	1.28	102.36	5.66	32.08	2.86
M13-A (5cm)	<LOD	NA	542.83	4.15	146.47	0.47	77.48	0.44
M13-A (25cm)	8.77	5.02	638.42	6.35	108.51	4.59	69.49	6.66
M13-A (40cm)	7.12	12.03	489.10	2.52	154.01	2.90	69.88	4.33

NA= No aplica <LOD= Debajo del límite de detección.

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Laboratorio Nacional de Geoquímica y Minerología
Universidad Nacional Autónoma de México
Geoquímica Ambiental



ID Campo	Fe		Mn		Pb		Zn	
	%	% CV	mg/Kg	% CV	mg/Kg	% CV	mg/Kg	% CV
LD	0.10		40.00		6.00		7.00	
M9-RB (5cm)	2.58	0.46	406.74	2.58	22.52	4.84	56.69	7.10
M9-RB (25cm)	2.76	0.22	456.27	3.41	20.83	6.49	51.47	2.22
M9-RB (50cm)	2.44	0.26	429.86	4.83	19.82	11.78	47.66	2.75
M10-A (5cm)	2.73	0.78	483.16	4.67	24.94	3.90	48.03	0.82
M10-A (25cm)	3.74	0.52	647.45	3.72	25.58	3.84	53.56	6.30
M10-A (50cm)	3.00	0.06	496.58	4.29	22.86	3.79	60.79	5.04
M10-LB (5cm)	3.54	0.38	623.65	1.72	24.48	2.88	65.87	6.85
M10-LB (25cm)	2.65	0.34	501.79	5.02	18.72	6.06	52.90	3.24
M10-LB (50cm)	2.96	0.11	430.02	3.02	20.92	9.28	61.10	5.44
M10-RB(5cm)	2.97	0.44	400.80	5.10	22.43	2.72	58.01	2.50
M10-RB (25cm)	2.89	0.29	438.05	0.80	18.50	12.97	54.31	5.15
M10-RB (50cm)	2.91	0.31	395.58	3.83	19.67	2.30	55.36	2.83
M11-A (5cm)	3.90	0.44	789.55	3.54	10.39	4.84	43.59	7.78
M11-A (25cm)	3.79	0.49	763.55	2.19	10.31	0.78	35.83	5.77
M11-A (50cm)	4.52	0.33	956.01	2.38	7.79	9.80	41.56	9.76
M11-LB (5cm)	4.24	0.07	776.75	2.23	12.12	13.11	45.41	3.18
M11-LB (25cm)	3.77	0.07	707.59	5.54	10.99	7.41	40.04	10.18
M11-LB (50cm)	3.69	0.50	709.92	1.19	10.22	7.24	40.36	3.77
M11-RB (5cm)	3.44	0.33	662.29	2.43	11.59	7.01	47.16	4.11
M11-RB (25cm)	4.14	0.42	736.15	1.51	7.53	8.26	40.69	2.08
M11-RB (50cm)	4.48	0.29	821.79	3.55	6.52	7.05	40.80	6.36
M12-A (5cm)	2.38	0.29	456.69	2.52	25.11	2.48	45.83	6.06
M12-A (25cm)	2.68	0.15	401.90	4.32	20.62	6.94	45.01	5.94
M12-A (50cm)	2.37	1.06	413.59	2.05	19.36	5.76	47.66	9.77
M12-LB (5cm)	3.56	0.48	600.47	3.53	13.37	8.01	46.91	1.18
M12-LB (25cm)	3.58	0.34	694.33	3.02	12.02	32.12	50.53	1.61
M12-LB (50cm)	3.43	0.17	621.75	3.19	11.91	9.67	49.54	5.09
M12-RB (5cm)	2.59	0.92	420.18	3.39	19.42	8.60	58.32	5.92
M12-RB (25cm)	2.75	0.74	519.82	7.32	18.61	8.31	51.63	2.22
M12-RB (50cm)	2.70	0.18	522.25	3.24	22.98	7.77	48.53	2.83
M13-A (5cm)	4.30	0.12	870.01	3.50	32.71	2.99	36.09	11.88
M13-A (25cm)	4.30	0.13	857.25	3.94	7.32	12.33	36.36	8.53
M13-A (40cm)	4.02	0.30	861.42	3.19	8.51	11.93	38.07	5.09

NA= No aplica

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Laboratorio Nacional de Geoquímica y Minerología
Universidad Nacional Autónoma de México
Geoquímica Ambiental



ID Campo	As		Ba		Cr		Cu	
	mg/Kg	% CV	mg/Kg	% CV	mg/Kg	% CV	mg/Kg	% CV
LD	5.00		30.00		10.00		9.00	
M13-LB (5cm)	7.39	7.46	315.62	7.79	178.50	3.44	100.11	1.64
M13-LB (25cm)	9.03	17.72	265.37	3.48	182.71	3.84	89.38	3.87
M13-LB (50cm)	10.07	8.36	287.64	6.37	124.25	0.59	91.22	0.79
M13-RB (5cm)	7.52	11.43	446.06	8.42	160.45	1.58	84.18	4.42
M13-RB (25cm)	9.60	17.31	423.61	6.30	131.66	3.48	98.11	5.41
M13-RB (50cm)	6.75	1.05	363.01	1.48	111.85	3.17	92.21	3.80
M14-A (5cm)	23.41	4.85	533.16	1.31	250.30	1.55	135.42	2.97
M14-A (25cm)	25.96	2.67	679.06	1.62	157.34	2.72	72.21	5.19
M14-A (40cm)	24.51	3.68	503.01	2.22	120.98	7.63	111.70	2.47
M14-LB (5cm)	21.74	8.69	204.52	4.25	141.54	4.97	74.31	0.78
M14-LB (25cm)	19.23	5.02	294.29	3.42	184.04	3.12	40.24	8.94
M14-LB (50cm)	18.45	2.43	218.40	8.89	140.62	2.02	37.28	11.74
M14-RB (5cm)	20.80	5.07	384.18	4.19	115.68	6.28	51.52	1.72
M14-RB (25cm)	27.53	6.90	110.41	0.44	113.63	2.86	55.52	4.56
M14-RB (50cm)	17.43	8.90	513.01	2.65	166.82	0.47	81.55	5.12
M15-A (0-5cm)	<LOD	NA	403.42	3.39	124.61	1.18	109.31	5.91
M15-A (5-25cm)	<LOD	NA	418.54	3.11	122.30	4.65	112.37	4.29
M15-A (25-50cm)	<LOD	NA	383.54	5.64	124.28	8.99	107.76	0.79
M15-A (+50cm)	<LOD	NA	166.44	11.47	104.14	5.78	81.16	3.21
M15-A (roca)	<LOD	NA	177.82	12.26	116.08	3.82	91.32	1.71
M15-LB (0-5cm)	8.86	10.22	284.35	2.04	218.02	2.18	90.34	3.24
M15-LB (5-25cm)	6.23	15.89	284.85	9.94	208.29	2.59	88.14	2.23
M15-LB (25-50cm)	6.31	12.45	221.40	12.33	147.51	1.65	93.93	8.75
M15-RB (0-5cm)	6.49	13.19	279.97	9.00	205.50	4.09	93.25	2.54
M15-RB (5-25cm)	<LOD	NA	224.48	10.30	135.68	6.20	85.29	3.61
M15-RB (25-50cm)	6.63	4.62	248.53	8.13	266.00	0.78	84.04	2.41
M16-A (0-5cm)	<LOD	NA	569.24	1.94	140.99	3.70	84.49	1.45
M16-A (5-25cm)	<LOD	NA	565.46	3.22	103.85	2.57	77.61	3.75
M16-A (25-50cm)	5.56	2.54	659.28	2.85	111.45	7.89	79.62	4.02
M16-LB (0-5cm)	6.48	19.73	179.56	9.80	119.33	9.86	83.04	2.18
M16-LB (5-25cm)	8.35	9.52	270.87	2.52	139.02	2.98	84.47	4.39
M16-LB (25-50cm)	6.87	18.94	135.35	18.35	117.50	1.94	85.06	2.93
M16-RB (0-5cm)	7.96	17.16	205.66	2.11	116.74	2.27	79.53	0.64
M16-RB (5cm)	7.72	6.84	205.06	7.69	127.81	1.42	85.55	0.99
M16-RB (25-50cm)	8.20	13.02	214.20	5.74	125.26	4.50	89.65	2.17

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Laboratorio Nacional de Geoquímica y Minerología
Universidad Nacional Autónoma de México
Geoquímica Ambiental



ID Campo	Fe		Mn		Pb		Zn	
	%	% CV	mg/Kg	% CV	mg/Kg	% CV	mg/Kg	% CV
LD	0.10		40.00		6.00		7.00	
M13-LB (5cm)	7.10	0.16	1333.75	0.34	8.83	26.64	49.28	5.87
M13-LB (25cm)	7.33	0.62	1326.76	4.02	9.08	2.08	49.65	8.91
M13-LB (50cm)	6.32	0.57	1289.04	0.39	6.33	1.79	45.85	5.34
M13-RB (5cm)	6.39	0.54	1220.35	1.41	12.01	8.63	50.41	1.55
M13-RB (25cm)	6.74	0.56	1339.64	3.40	9.02	15.79	47.61	8.95
M13-RB (50cm)	6.41	0.26	1295.14	2.87	11.19	7.22	45.78	9.80
M14-A (5cm)	9.44	0.18	1231.42	1.43	12.49	3.05	47.46	4.36
M14-A (25cm)	4.02	0.48	697.16	3.01	11.51	17.56	41.87	1.45
M14-A (40cm)	10.19	0.52	1297.23	1.02	13.26	7.94	58.43	5.35
M14-LB (5cm)	5.99	0.28	948.00	1.90	15.62	13.59	60.07	8.00
M14-LB (25cm)	4.85	0.07	901.64	1.21	8.63	3.53	39.87	7.88
M14-LB (50cm)	4.89	0.49	872.33	5.66	8.55	11.64	36.83	8.74
M14-RB (5cm)	3.44	0.67	461.26	4.81	18.81	13.01	56.38	4.16
M14-RB (25cm)	4.57	0.02	644.12	4.63	14.05	2.20	44.20	8.07
M14-RB (50cm)	4.78	0.44	894.93	2.32	12.38	3.89	47.35	4.84
M15-A (0-5cm)	6.40	0.14	1570.13	2.51	6.96	7.11	38.45	9.57
M15-A (5-25cm)	6.48	0.28	1473.24	2.42	<LOD	NA	39.30	14.41
M15-A (25-50cm)	6.52	0.79	1408.78	0.47	<LOD	NA	37.62	11.65
M15-A (+50cm)	4.75	0.15	990.36	0.76	<LOD	NA	31.01	4.78
M15-A (roca)	4.50	0.53	1019.60	3.34	<LOD	NA	36.02	7.33
M15-LB (0-5cm)	5.98	0.47	1136.28	2.16	<LOD	NA	37.66	14.80
M15-LB (5-25cm)	6.67	0.44	1296.09	4.39	6.47	6.56	37.02	12.81
M15-LB (25-50cm)	5.86	0.57	1197.81	1.95	7.10	7.52	35.58	11.63
M15-RB (0-5cm)	6.36	0.20	1247.07	0.67	7.72	11.75	36.72	8.70
M15-RB (5-25cm)	5.99	0.47	1108.62	2.49	7.37	4.61	41.11	10.03
M15-RB (25-50cm)	6.03	0.16	1207.91	2.44	<LOD	NA	39.62	4.20
M16-A (0-5cm)	4.35	0.22	1033.50	3.39	7.40	18.33	36.57	6.89
M16-A (5-25cm)	3.91	0.81	940.76	2.66	7.17	15.58	32.51	19.80
M16-A (25-50cm)	4.14	0.20	988.06	4.72	6.64	12.92	33.22	16.30
M16-LB (0-5cm)	5.26	0.70	969.34	3.12	9.52	6.17	44.95	6.06
M16-LB (5-25cm)	5.72	0.23	1094.69	1.96	11.59	3.84	45.24	10.38
M16-LB (25-50cm)	5.57	0.64	1052.85	3.81	9.80	11.14	41.58	10.61
M16-RB (0-5cm)	5.46	0.24	1027.41	1.53	10.95	7.62	45.43	10.59
M16-RB (5cm)	5.59	0.19	985.99	4.16	9.57	2.47	44.76	2.97
M16-RB (25-50cm)	6.05	0.27	1125.97	1.27	9.09	19.45	42.33	6.42

NA= No aplica

<LOD= Debajo del límite de detección.



CONTROL DE CALIDAD

pH y CE:

Para la precisión de los análisis de pH se determinaron algunas mediciones por duplicado reportando un %DPR de las mediciones (menor al 10%).

ID campo	pH	CE	%DPR pH	%DPR CE
M1-RB (50)	8.26	43	1.83	7.23
	8.11	40		
M3-RB (50) DUP	7.88	60.2	7.45	5.46
	8.49	57		
M16-A (0-5)	8.3	44.4	2.73	6.03
	8.53	41.8		
FM13-LB (50)	8.47	71.7	0.82	3.55
	8.54	69.2		
FM14-A(5)	7.33	140.4	4.53	9.24
	7.67	154		
FM10-LB(25)	8.18	65.6	2.30	2.78
	8.37	63.8		
FM14-A(5)	7.33	140.4	4.53	9.39
	7.67	154		

FRX:

Para la precisión de los análisis de FRX las mediciones se determinaron por triplicado, el valor reportado es el promedio de las tres determinaciones reportando también el % del coeficiente de variación (CV) de las mediciones (menor al 20%).

Para determinar la exactitud en FRX se utilizaron estándares certificados (TILL-4 y NIST-2710a) como control analítico los cuales fueron analizados como muestra para determinar su concentración las concentraciones se encontraron entre el 84 y el 112% lo cual indica un buen desempeño del método de análisis.

Estándares	%Exactitud							
	As	Ba	Cu	Cr	Fe	Mn	Pb	Zn
TILL-4	98.34	99.53	93.87	105.7	100.3	97.6	92.4	NA
NIST-2710a	100.7	NA	112.1	93.7	102.8	84.9	87.7	99.05



CONTROL DE CALIDAD

Precisión

Para la precisión de los análisis de FRX las mediciones se determinaron por triplicado, el valor reportado es el promedio de las tres determinaciones reportando también el % del coeficiente de variación (CV) de las mediciones (menor al 20%).

Exactitud

Para determinar la exactitud en FRX se utilizaron estándares certificados (TILL-4 y NIST-2710a) como control analítico los cuales fueron analizados como muestra para determinar su concentración las concentraciones se encontraron entre el 84 y el 112% lo cual indica un buen desempeño del método de análisis.

Estándares	%Exactitud							
	As	Ba	Cu	Cr	Fe	Mn	Pb	Zn
TILL-4	98.34	99.53	93.87	105.7	100.3	97.6	92.4	NA
NIST-2710a	100.7	NA	112.1	93.7	102.8	84.9	87.7	99.05

Sin mas por al momento quedo a sus ordenes.

Analistas:

QFB. Fabiola Vega García

M en C Alicia Santana Silva

QA Daniel Ramos Pérez

Victor Guillermo Montaño Jiménez

Reviso:

M en C Luis Gerardo Martínez Jardines



INFORME DE RESULTADOS
FONDOS

Datos del solicitante:

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 Dirección: Instituto de Geología, UNAM. Teléfono: 56224386 ext. 129

Información de las muestras

Fecha de recepción de muestras: 13 de julio del 2015

Se recibieron 90 muestras de suelos preservadas e identificadas adecuadamente, en bolsas de plástico.

Información de los análisis

En el laboratorio de Geoquímica Ambiental las muestras fueron homogeneizadas y tamizadas por malla N° 10 para su análisis de pH, Conductividad eléctrica y FRX.

El pH se determinó con un potenciómetro Hanna Instruments, HI-98185 y se siguió el método estandarizado 9040 C de la US-EPA .

Conductividad eléctrica (CE) se determinó con un conductímetro OAKTON Con 700. y se siguió el método APHA 1992. Standard methods for the examination of water and wastewater.

Fluorescencia de rayos X. El análisis se determinó con un equipo de Fluorescencia de Rayos X, NITTON FXL 950 de Thermo Scientific y se siguió el método EPA 6200. La determinación fue realizada por triplicado con un tiempo de medición de 90s en el modo de suelo y 31 s en el modo de mina para Fe. Los elementos cuantificados en cada determinación se reportan en mg/kg (ppm) para el modo de suelo y (%) para el modo de mina

Listado de recepción de muestras:

ID Campo	coordenadas		ID Campo	coordenadas	
	X	Y		X	Y
F-Vicente G. 1	560577	3409923	F. Vicente G. 5 (25 cm)	554972	3406344
F-Vicente G. 2	558663	3410590	F. Vicente G. 5 (50 cm)	554972	3406344
F-Vicente G. 2Roca	558672	3410647	F. Vicente G. 6	554738	3405426



Laboratorio Nacional de Geoquímica y Minerología
Universidad Nacional Autónoma de México
Geoquímica Ambiental



ID Campo	coordenadas		ID Campo	coordenadas	
	X	Y		X	Y
F-R. Bacanuchi 1	562277	3402776	F-Arizpe 2 Roca	574919	3360063
F-S Gertrudis 1	566148	3396520	F-Arizpe 3	573823	3361921
F-S Gertrudis 2	564449	3397136	F-Arizpe 3 roca	573787	3361868
F-S Gertrudis 3 (0-5cm)	562455	3397287	F.S.J de baviacora 1A	581913	3290190
F-S Gertrudis 3 (5-25cm)	562455	3397287	F.S.J de baviacora 1-LB	581903	3290201
F-S Gertrudis 3 (25-50cm)	562455	3397287	F.S.J de baviacora 1-RB	581912	3290174
F-Bacanuchi I1 (0-5cm)	570280	3384774	F.S.J de baviacora 2A	584411	3294075
F-Bacanuchi I1 (5-25cm)	570280	3384774	F.S.J de baviacora 2 LB	584509	3293980
F-Bacanuchi I1 (25-50cm)	570280	3384774	F.S.J de baviacora 2-RB	584411	3294075
F-Bacanuchi I2 (0-5cm)	568528	3387253	F.S.J de baviacora 3 A	589640	3297200
F-Bacanuchi I2 (5-25cm)	568528	3387253	F.S.J de baviacora 3 A (Blanco)	589640	3297200
F-Bacanuchi I2 (25-50cm)	568528	3387253	F.S.J de baviacora 3 LB	589640	3297200
F-Bacanuchi I3 (0-5cm)	565140	3388400	F.S.J de baviacora 3 Roca	589640	3297200
F-Bacanuchi I3 (5-25cm)	565140	3388400	F-Mazocahuí 1	585435	3268896
F-Bacanuchi I3 (25-50cm)	565140	3388400	F-Mazocahuí 2	587336	3270510
F-Bacanuchi D1	573778	3385894	F-Mazocahuí 3	590056	3271942
F-Bacanuchi D2	574922	3386716	F-Rayon 1	557090	3257929
F-Bacanuchi D2-Roca	575052	3387553	F-Rayón 2	553716	3263681
F-Bacanuchi D3	575154	3387695	F-Rayon 3	554469	3265889
F-Tahuichopa 1	579685	3360491	F-San Francisco 1-A (0-5cm)	535839	3232678
F-Tahuichopa 1 Roca	579685	3360491	F-San Francisco 1-A (5-25cm)	535839	3232678
F-Tahuichopa 2	577630	3360955	F-San Francisco 1-A (25-50cm)	535839	3232678
F-Tahuichopa 3	576578	3362620	F-San Francisco 1-LB (0-25cm)	535873	3232703
F-Tahuichopa 3 Roca	576578	3362620	F-San Francisco 1-LB (25-50cm)	535873	3232703
F-Tahuichopa 4	579163	3364331	F-San Francisco 1-RB (0-25cm)	535816	3232655
F-Tahuichopa 4 Roca	579131	3364268	F-San Francisco 1-RB (25-50cm)	535816	3232655
F-Tahuichopa 5	577232	3368791	F-San Francisco 2 roca	539060	3229795
F-Tahuichopa 5 roca	577232	3368791	F-San Francisco 2-A (0-5cm)	539045	3229768
F-Tahuichopa 6	576094	3372320	F-San Francisco 2-A (5-25cm)	539045	3229768
F-Tahuichopa 6 Roca	576094	3372320	F-San Francisco 2-A (25-45cm)	539045	3229768
F-Arizpe 1	576808	3357063	F-San Francisco 2-LB (0-5cm)	539067	3229780
F-Arizpe 1 Roca	576795	3357032	F-San Francisco 2-LB (5-25cm)	539067	3229780
F-Arizpe 2	575076	3360046	F-San Francisco 2-LB (25-40cm)	539067	3229780



ID Campo	coordenadas		ID Campo	coordenadas	
	X	Y		X	Y
F-San Francisco 2-RB (0-5cm)	539024	3229763	F-San Francisco 3-RB (0-5cm)	538883	3228261
F-San Francisco 2-RB (5-25cm)	539024	3229763	F-San Francisco 3-RB (5-25cm)	538883	3228261
F-San Francisco 2-RB (25-50cm)	539024	3229763	F-San Francisco 3-RB (25-50cm)	538883	3228261
F-San Francisco 3A (5-25cm)	538885	3228288	F-San Francisco 3 roca	538904	3228302
F-San Francisco 3A (25-40cm)	538885	3228288	F.La junta A(5cm)	528730	3229891
F-San Francisco 3-LB (0-5cm)	538873	3228299	F.La junta A(25cm)	528730	3229891
F-San Francisco 3-LB (5-25cm)	538873	3228299	F.La junta A(50cm)	528730	3229891
F-San Francisco 3-LB (25-50cm)	538873	3228299			

Resultados de pH y CE:

ID Campo	pH	CE (us/cm)	ID Campo	pH	CE (us/cm)
F-Vicente G. 1	7.65	29.55	F-Bacanuchi I2 (0-5cm)	8.77	52.90
F-Vicente G. 2	7.39	25.50	F-Bacanuchi I2 (5-25cm)	8.59	51.20
F-Vicente G. 2Roca	7.62	18.14	F-Bacanuchi I2 (25-50cm)	8.53	58.20
F. Vicente G. 5 (5 cm)	7.62	28.75	F-Bacanuchi I3 (0-5cm)	8.62	36.00
F. Vicente G. 5 (25 cm)	8.41	43.70	F-Bacanuchi I3 (5-25cm)	8.64	42.40
F. Vicente G. 5 (50 cm)	8.33	29.30	F-Bacanuchi I3 (25-50cm)	8.68	38.00
F. Vicente G. 6	8.84	49.00	F-Bacanuchi D1	8.16	69.5
F. Vicente G. 7	8.60	105.40	F-Bacanuchi D2	8.31	63.0
F-R. Bacanuchi 1	7.59	44.20	F-Bacanuchi D2-Roca	8.79	87.10
F-S Gertrudis 1	8.39	62.80	F-Bacanuchi D3	8.23	52.0
F-S Gertrudis 2	7.34	48.00	F-Tahuichopa 1	7.32	58.50
F-S Gertrudis 3 (0-5cm)	7.76	62.50	F-Tahuichopa 1 Roca	8.64	117.50
F-S Gertrudis 3 (5-25cm)	7.93	38.70	F-Tahuichopa 2	8.32	50.90
F-S Gertrudis 3 (25-50cm)	7.80	38.00	F-Tahuicopa 3	7.14	100.90
F-Bacanuchi I1 (0-5cm)	8.62	62.00	F-Tahuicopa 3 Roca	7.29	193.70
F-Bacanuchi I1 (5-25cm)	8.69	50.60	F-Tahuichopa 4	8.89	38.20
F-Bacanuchi I1 (25-50cm)	8.80	51.70	F-Tahuicopa 4 Roca	9.04	67.60



**Laboratorio Nacional de Geoquímica y Minerología
Universidad Nacional Autónoma de México
Geoquímica Ambiental**



ID Campo	pH	CE (us/cm)	ID Campo	pH	CE (us/cm)
F-Tahuichopa 5	8.99	49.2	F-San Francisco 1-A (25-50cm)	8.69	38.1
F-Tahuichopa 5 roca	8.88	146.7	F-San Francisco 1-LB (0-25cm)	7.88	181.8
F-Tahuichopa 6	9.12	56.4	F-San Francisco 1-LB (25-50cm)	8.03	111.5
F-Tahuichopa 6 Roca	7.85	187.8	F-San Francisco 1-RB (0-25cm)	8.51	66.7
F-Arizpe 1	9.05	63.8	F-San Francisco 1-RB (25-50cm)	8.25	94.4
F-Arizpe 1 Roca	9.04	46	F-San Francisco 2 roca	9.4	40.6
F-Arizpe 2	9.03	47.1	F-San Francisco 2-A (0-5cm)	8.67	42.2
F-Arizpe 2 Roca	6.51	886	F-San Francisco 2-A (5-25cm)	8.85	39.4
F-Arizpe 3	9.09	50.5	F-San Francisco 2-A (25-45cm)	8.75	37.8
F-Arizpe 3 roca	7.8	44.3	F-San Francisco 2-LB (0-5cm)	8.55	77.7
F.S.J de baviacora 1A	7.63	16.3	F-San Francisco 2-LB (5-25cm)	8.28	89.2
F.S.J de baviacora 1-LB	7.29	28.6	F-San Francisco 2-LB (25-40cm)	8.41	80
F.S.J de baviacora 1-RB	6.95	115.6	F-San Francisco 2-RB (0-5cm)	8.65	55.3
F.S.J de baviacora 2A	6.69	32.9	F-San Francisco 2-RB (5-25cm)	8.35	66.7
F.S.J de baviacora 2 LB	7.13	41.5	F-San Francisco 2-RB (25-50cm)	8.58	42.1
F.S.J de baviacora 2-RB	6.84	19.87	F-San Francisco 3A (5-25cm)	8.57	46.3
F.S.J de baviacora 3 A	7.07	37.6	F-San Francisco 3A (25-40cm)	8.52	40.6
F.S.J de baviacora 3 A (Blanco)	6.42	43.22	F-San Francisco 3-LB (0-5cm)	8.48	52.3
F.S.J de baviacora 3 LB	5.35	58.6	F-San Francisco 3-LB (5-25cm)	8.42	59.7
F.S.J de baviacora 3 Roca	8.81	86	F-San Francisco 3-LB (25-50cm)	8.84	58.6
F-Mazocahuí 1	7.97	109.8	F-San Francisco 3-RB (0-5cm)	8.62	43.5
F-Mazocahuí 2	7.79	124.2	F-San Francisco 3-RB (5-25cm)	8.58	49.5
F-Mazocahuí 3	6.25	26.8	F-San Francisco 3-RB (25-50cm)	8.53	64.6
F-Rayon 1	7.41	168.2	F-San Francisco 3 roca	8.97	47.9
F-Rayón 2	8.51	38	F.La junta A(5cm)	9.02	34.9
F-Rayon 3	6.95	24.4	F.La junta A(25cm)	8.65	35.05
F-San Francisco 1-A (0-5cm)	8.72	39.9	F.La junta A(50cm)	8.64	27
F-San Francisco 1-A (5-25cm)	8.52	36.3			



Resultados de FRX :

ID Campo	As		Ba		Cr		Cu	
	mg/Kg	% CV	mg/Kg	% CV	mg/Kg	% CV	mg/Kg	% CV
LD	5.00		30.00		10.00		9.00	
F-Vicente G. 1	16.65	12.26	926.19	1.62	96.84	4.99	83.52	3.51
F-Vicente G. 2	10.28	12.84	949.44	1.31	87.15	9.28	72.04	6.29
F-Vicente G. 2Roca	12.55	5.80	627.35	2.28	81.65	2.83	41.36	4.18
F. Vicente G. 5 (5 cm)	10.95	4.08	849.96	1.05	110.58	1.29	40.57	1.67
F. Vicente G. 5 (25 cm)	12.41	8.82	899.62	1.89	96.39	6.17	63.25	6.52
F. Vicente G. 5 (50 cm)	11.39	4.81	919.11	0.83	130.26	4.43	54.09	4.99
F. Vicente G. 6	<LOD	NA	899.93	0.44	174.60	4.35	91.01	1.28
F. Vicente G. 7	56.57	1.54	1012.23	1.75	89.86	0.71	37.93	6.24
F-R. Bacanuchi 1	15.21	17.61	633.81	0.74	93.25	2.65	55.29	4.44
F-S Gertrudis 1	18.80	12.23	746.29	2.16	86.49	1.13	60.65	5.87
F-S Gertrudis 2	30.19	15.03	752.78	0.97	90.25	3.20	68.37	2.46
F-S Gertrudis 3 (0-5cm)	30.26	8.85	773.73	2.86	97.72	3.84	75.73	2.84
F-S Gertrudis 3 (5-25cm)	32.68	5.08	558.46	1.20	110.90	4.87	68.67	3.45
F-S Gertrudis 3 (25-50cm)	37.82	4.52	662.72	2.18	91.33	2.49	82.30	1.56
F-Bacanuchi I1 (0-5cm)	30.62	8.97	880.47	2.05	139.74	6.15	48.43	6.52
F-Bacanuchi I1 (5-25cm)	27.07	1.43	899.35	1.07	139.51	6.59	46.69	13.82
F-Bacanuchi I1 (25-50cm)	35.06	3.81	724.65	0.07	151.99	3.85	44.97	10.33
F-Bacanuchi I2 (0-5cm)	16.72	11.86	824.97	0.39	107.86	5.98	34.53	6.25
F-Bacanuchi I2 (5-25cm)	27.51	11.56	880.89	1.08	177.91	2.19	48.70	3.13
F-Bacanuchi I2 (25-50cm)	28.74	6.42	937.30	2.42	177.22	5.26	51.45	4.84
F-Bacanuchi I3 (0-5cm)	15.97	8.77	467.29	1.95	141.18	2.44	40.26	7.33
F-Bacanuchi I3 (5-25cm)	17.50	4.27	521.87	0.90	144.41	3.35	35.75	3.66
F-Bacanuchi I3 (25-50cm)	17.37	6.32	645.56	1.42	89.96	1.92	37.69	3.88
F-Bacanuchi D1	22.29	8.13	555.98	3.48	91.57	10.96	57.49	1.71
F-Bacanuchi D2	14.39	9.32	776.28	1.75	170.11	4.70	92.32	5.22
F-Bacanuchi D2-Roca	11.63	11.23	715.83	2.85	105.26	6.23	59.99	2.72
F-Bacanuchi D3	33.27	9.68	771.84	3.42	85.59	2.05	76.73	3.56



**Laboratorio Nacional de Geoquímica y Minerología
Universidad Nacional Autónoma de México
Geoquímica Ambiental**



ID Campo	Fe		Mn		Pb		Zn	
	%	% CV	mg/Kg	% CV	mg/Kg	% CV	mg/Kg	% CV
LD	0.10		40.00		6.00		7.00	
F-Vicente G. 1	2.84	0.41	805.05	1.69	50.50	2.39	113.56	2.36
F-Vicente G. 2	2.78	0.16	708.57	1.89	70.94	1.87	94.36	1.97
F-Vicente G. 2Roca	2.70	0.25	647.63	3.46	19.97	6.97	59.77	2.57
F. Vicente G. 5 (5 cm)	2.38	0.26	508.61	7.36	18.39	3.43	52.75	6.09
F. Vicente G. 5 (25 cm)	3.46	0.20	673.40	3.25	24.97	7.45	63.72	3.48
F. Vicente G. 5 (50 cm)	4.06	0.40	722.46	2.49	23.01	4.06	61.05	9.14
F. Vicente G. 6	6.17	0.16	1151.29	2.66	12.36	6.94	66.36	0.52
F. Vicente G. 7	2.41	0.32	848.86	6.05	11.95	1.14	52.86	10.87
F-R. Bacanuchi 1	2.64	0.31	564.80	4.23	17.90	17.55	64.48	1.30
F-S Gertrudis 1	3.15	0.21	543.81	0.92	25.65	10.88	68.81	4.57
F-S Gertrudis 2	3.33	0.50	683.77	5.50	31.66	5.64	87.92	4.68
F-S Gertrudis 3 (0-5cm)	2.66	0.23	810.32	0.47	40.22	1.95	99.13	4.79
F-5 Gertrudis 3 (5-25cm)	3.51	0.55	861.27	3.51	72.67	4.77	107.55	4.88
F-S Gertrudis 3 (25-50cm)	2.70	0.37	710.51	0.40	52.67	6.40	95.88	1.51
F-Bacanuchi I1 (0-5cm)	2.49	0.57	1011.67	0.87	67.81	3.43	76.11	3.45
F-Bacanuchi I1 (5-25cm)	2.03	0.59	674.91	2.57	40.89	4.25	62.96	4.53
F-Bacanuchi I1 (25-50cm)	2.18	0.65	689.24	3.84	40.28	3.45	62.17	3.10
F-Bacanuchi I2 (0-5cm)	2.09	0.34	575.68	3.26	17.41	10.64	45.71	1.48
F-Bacanuchi I2 (5-25cm)	2.55	0.63	743.78	1.27	41.37	5.90	63.44	3.31
F-Bacanuchi I2 (25-50cm)	2.79	0.19	725.29	3.88	34.39	4.14	61.45	6.68
F-Bacanuchi I3 (0-5cm)	2.27	0.23	421.97	4.00	13.57	2.71	36.90	3.47
F-Bacanuchi I3 (5-25cm)	2.22	0.15	434.22	3.34	12.04	19.93	38.11	3.24
F-Bacanuchi I3 (25-50cm)	2.34	0.31	523.26	4.12	13.08	8.70	42.63	3.25
F-Bacanuchi D1	2.82	0.30	776.82	2.85	24.08	6.04	58.53	5.58
F-Bacanuchi D2	3.99	0.06	686.46	1.41	13.60	6.19	56.44	3.14
F-Bacanuchi D2-Roca	2.36	0.70	552.12	2.60	14.43	3.61	53.20	3.46
F-Bacanuchi D3	3.22	0.25	702.93	1.88	20.26	11.67	61.19	2.89

NA= No aplica

<LOD= Debajo del limite de detección.



Laboratorio Nacional de Geoquímica y Minerología
Universidad Nacional Autónoma de México
Geoquímica Ambiental



ID Campo	As		Ba		Cr		Cu	
	mg/Kg	% CV	mg/Kg	% CV	mg/Kg	% CV	mg/Kg	% CV
ID	5.00		30.00		10.00		9.00	
F-Tahuichopa 1	24.33	8.57	617.06	3.07	86.15	8.36	55.61	1.00
F-Tahuichopa 1 Roca	14.93	18.00	155.46	9.28	65.94	6.27	38.51	6.81
F-Tahuichopa 2	46.85	2.87	688.42	1.70	66.96	6.97	55.14	0.69
F-Tahuicopa 3	37.03	2.51	558.13	7.86	69.89	3.77	57.12	3.05
F-Tahuicopa 3 Roca	37.73	1.28	434.42	1.76	73.54	7.23	46.11	1.48
F-Tahuichopa 4	23.71	3.58	664.02	2.05	96.52	6.40	43.69	5.79
F-Tahuichopa 4 Roca	<LOD	NA	426.76	0.45	101.86	8.91	25.46	18.87
F-Tahuichopa 5	17.27	8.57	595.53	2.78	104.72	6.08	42.70	0.93
F-Tahuichopa 5 roca	5.44	11.75	858.41	0.91	123.58	6.12	60.27	3.39
F-Tahuichopa 6	20.86	10.41	776.97	1.38	117.26	6.38	48.91	8.68
F-Tahuichopa 6 Roca	53.30	6.40	312.81	2.13	67.32	13.74	40.29	4.39
F-Ariza 1	38.97	1.02	749.10	1.82	83.54	5.66	82.09	2.78
F-Ariza 1 Roca	22.21	4.95	673.97	0.72	114.71	4.56	42.04	7.02
F-Ariza 2	50.37	1.13	462.15	5.71	70.75	4.14	75.34	4.62
F-Ariza 2 Roca	28.91	2.58	411.72	7.18	121.94	1.27	349.47	0.84
F-Ariza 3	35.69	5.47	589.73	4.17	79.54	3.42	67.13	4.28
F-Ariza 3 roca	77.69	1.94	605.42	1.37	97.25	4.69	59.72	5.94
F.S.J de baviacora 1A	47.34	3.18	636.49	3.73	66.37	5.45	251.62	0.74
F.S.J de baviacora 1-LB	75.81	1.54	565.48	3.15	70.29	8.53	177.29	5.15
F.S.J de baviacora 1-RB	109.16	1.39	571.12	3.84	76.96	5.06	196.65	0.85
F.S.J de baviacora 2A	107.86	1.99	607.98	1.75	65.36	7.10	252.22	3.85
F.S.J de baviacora 2 LB	30.33	1.85	425.86	5.00	72.53	5.14	56.11	1.19
F.S.J de baviacora 2-RB	142.27	1.85	601.12	3.76	78.88	0.71	216.25	0.70
F.S.J de baviacora 3 A	280.38	1.86	490.20	3.88	68.36	9.53	129.68	4.68
F.S.J de baviacora 3 A (Blanco)	169.75	0.82	524.66	3.27	73.85	3.30	1474.59	1.28
F.S.J de baviacora 3 LB	7.84	4.58	776.01	4.10	75.87	9.90	59.50	4.50
F.S.J de baviacora 3 Roca	<LOD	NA	1071.55	5.19	75.71	6.34	78.99	5.02
F-Mazocahuí 1	<LOD	NA	629.37	2.15	73.53	6.61	46.37	4.28
F-Mazocahuí 2	<LOD	NA	610.42	2.77	63.94	7.71	61.97	4.98
F-Mazocahuí 3	<LOD	NA	368.81	5.07	113.75	7.28	135.25	4.44
F-Rayón 1	<LOD	NA	622.74	3.65	77.78	0.98	32.59	4.56
F-Rayón 2	6.19	8.80	555.50	1.77	81.37	5.53	33.56	5.27
F-Rayón 3	<LOD	NA	543.72	1.64	94.64	4.02	30.14	2.80



Laboratorio Nacional de Geoquímica y Minerología
Universidad Nacional Autónoma de México
Geoquímica Ambiental



ID Campo	Fe		Mn		Pb		Zn	
	%	% CV	mg/Kg	% CV	mg/Kg	% CV	mg/Kg	% CV
LD	0.10		40.00		6.00		7.00	
F-Tahuichopa 1	2.40	0.30	468.30	2.37	24.50	1.45	68.59	1.31
F-Tahuichopa 1 Roca	2.17	0.69	386.52	0.61	11.95	8.70	49.08	3.64
F-Tahuichopa 2	3.60	0.42	713.67	3.66	38.85	3.38	100.73	5.08
F-Tahuicopa 3	2.88	0.28	459.87	4.10	27.03	2.15	57.23	5.66
F-Tahuicopa 3 Roca	2.04	0.31	131.06	2.20	48.89	4.27	27.30	8.22
F-Tahuichopa 4	2.36	0.57	568.13	1.98	16.03	8.04	44.59	7.10
F-Tahuichopa 4 Roca	1.58	0.27	563.11	4.18	8.76	17.26	72.57	3.18
F-Tahuichopa 5	2.70	0.39	516.30	2.20	17.76	7.87	48.70	0.56
F-Tahuichopa 5 roca	3.04	0.16	894.32	0.97	18.71	2.22	64.20	2.09
F-Tahuichopa 6	2.58	0.17	508.20	3.79	17.51	7.01	43.23	4.81
F-Tahuichopa 6 Roca	10.74	0.42	87.22	1.52	9.95	9.46	<LOD	NA
F-Arizpe 1	3.87	0.45	684.89	2.06	31.49	8.11	66.96	2.26
F-Arispe 1 Roca	1.99	0.43	415.16	2.85	17.90	5.27	41.19	6.03
F-Arizpe 2	3.03	0.14	410.14	2.97	39.56	3.99	72.45	5.52
F-Arizpe 2 Roca	4.10	0.34	188.94	7.07	11.81	8.13	133.58	1.01
F-Arizpe 3	2.88	0.32	596.80	0.58	18.00	5.44	60.73	4.56
F-Arizpe 3 roca	2.72	0.41	1127.54	1.96	1077.89	0.78	216.67	1.08
F.S.J de baviacora 1A	1.81	0.84	506.69	2.82	28.53	1.67	198.66	1.82
F.S.J de baviacora 1-LB	3.31	0.93	703.25	3.32	46.06	2.97	148.86	0.45
F.S.J de baviacora 1-RB	3.85	0.22	773.21	3.00	53.57	2.56	149.04	4.97
F.S.J de baviacora 2A	3.36	0.33	653.93	1.61	47.02	2.41	182.57	3.74
F.S.J de baviacora 2 LB	2.81	0.27	758.59	4.18	45.02	2.39	126.81	2.44
F.S.J de baviacora 2-RB	4.24	0.56	814.33	1.70	49.98	3.29	155.26	0.55
F.S.J de baviacora 3 A	3.34	0.56	460.64	3.30	60.03	4.05	71.00	2.74
F.S.J de baviacora 3 A (Blanco)	2.09	0.33	347.80	3.37	60.56	1.80	121.41	3.88
F.S.J de baviacora 3 LB	3.45	0.38	544.96	2.92	20.59	14.09	62.30	0.96
F.S.J de baviacora 3 Roca	3.30	0.10	668.89	1.63	15.03	7.01	64.67	4.31
F-Mazocahuí 1	2.86	0.40	671.92	4.28	19.73	13.39	67.71	5.31
F-Mazocahuí 2	4.26	0.27	866.70	0.83	16.24	9.63	67.80	4.09
F-Mazocahuí 3	17.09	0.35	795.88	4.66	26.85	9.75	<LOD	NA
F-Rayón 1	0.45	1.28	150.34	12.29	16.58	4.10	18.03	5.69
F-Rayón 2	0.91	0.05	202.37	3.34	16.42	5.21	22.03	11.64



Laboratorio Nacional de Geoquímica y Minerología
Universidad Nacional Autónoma de México
Geoquímica Ambiental



F-Rayon 3	1.24	0.39	406.25	1.30	20.42	6.55	25.15	4.01
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NA= No aplica <LOD= Debajo del límite de detección.

ID Campo	As		Ba		Cr		Cu	
	mg/Kg	% CV	mg/Kg	% CV	mg/Kg	% CV	mg/Kg	% CV
LD	5.00		30.00		10.00		9.00	
F-San Francisco 1-A (0-5cm)	11.09	8.83	666.37	1.26	173.29	2.56	29.00	15.41
F-San Francisco 1-A (5-25cm)	7.60	6.14	780.09	0.54	133.70	2.70	28.94	4.70
F-San Francisco 1-A (25-50cm)	8.39	13.07	679.02	2.03	157.67	7.08	24.04	11.28
F-San Francisco 1-LB (0-25cm)	10.68	5.11	745.93	1.34	123.53	6.47	37.29	10.58
F-San Francisco 1-LB (25-50cm)	12.39	15.36	562.94	0.63	129.41	1.80	35.55	3.25
F-San Francisco 1-RB (0-25cm)	10.81	5.39	679.84	2.54	117.80	1.59	41.48	4.84
F-San Francisco 1-RB (25-50cm)	12.00	7.40	587.62	4.75	117.68	0.45	35.34	7.13
F-San Francisco 2 roca	14.68	5.36	635.76	2.42	89.82	4.86	69.05	0.54
F-San Francisco 2-A (0-5cm)	8.50	13.51	873.39	0.30	166.32	4.46	29.12	4.93
F-San Francisco 2-A (5-25cm)	9.75	16.85	621.95	1.57	172.14	1.56	21.46	9.78
F-San Francisco 2-A (25-45cm)	8.82	19.46	681.39	2.00	194.58	3.07	24.52	17.77
F-San Francisco 2-LB (0-5cm)	9.88	3.53	601.62	1.17	125.74	3.31	31.29	1.17
F-San Francisco 2-LB (5-25cm)	10.06	4.68	586.63	3.69	106.51	6.45	33.76	2.00
F-San Francisco 2-LB (25-40cm)	10.30	3.64	520.02	2.61	123.37	5.91	26.96	1.84
F-San Francisco 2-RB (0-5cm)	7.24	0.10	575.34	1.55	153.87	3.67	23.28	5.86
F-San Francisco 2-RB (5-25cm)	8.36	19.90	691.14	2.13	172.87	2.85	27.05	5.16
F-San Francisco 2-RB (25-50cm)	10.59	2.68	842.89	2.33	146.85	1.12	22.61	13.25
F-San Francisco 3A (5-25cm)	9.17	4.78	645.64	2.11	164.37	1.69	20.62	11.98
F-San Francisco 3A (25-40cm)	9.11	8.30	614.99	2.05	166.19	2.87	22.20	3.00
F-San Francisco 3-LB (0-5cm)	7.63	19.26	591.68	3.27	186.95	1.02	20.19	11.85
F-San Francisco 3-LB (5-25cm)	9.88	4.01	530.41	1.46	126.75	4.71	27.61	7.43
F-San Francisco 3-LB (25-50cm)	11.91	9.88	626.67	2.90	141.81	2.52	29.96	8.09
F-San Francisco 3-RB (0-5cm)	10.33	15.72	552.07	1.48	128.49	4.46	30.14	2.48
F-San Francisco 3-RB (5-25cm)	8.50	4.32	654.15	1.02	137.32	2.44	23.89	12.83
F-San Francisco 3-RB (25-50cm)	8.72	11.83	646.71	0.80	128.57	4.19	26.42	8.23
F-San Francisco 3 roca	9.44	14.30	525.70	2.76	145.24	1.69	32.46	5.33
F.La junta A(5cm)	36.35	2.83	1033.30	4.94	72.53	3.55	43.81	5.51
F.La junta A(25cm)	38.49	10.03	930.70	1.59	82.02	1.73	48.63	2.68
F.La junta A(50cm)	39.80	4.57	925.63	2.10	84.30	3.50	46.11	2.37



NA= No aplica <LOD= Debajo del límite de detección.

ID Campo	Fe		Mn		Pb		Zn	
	%	% CV	mg/Kg	% CV	mg/Kg	% CV	mg/Kg	% CV
LD	0.10		40.00		6.00		7.00	
F-San Francisco 1-A (0-5cm)	1.14	0.52	362.00	1.16	23.06	3.47	34.32	7.17
F-San Francisco 1-A (5-25cm)	1.11	0.10	347.27	1.64	32.54	3.75	30.47	2.03
F-San Francisco 1-A (25-50cm)	0.99	0.26	311.20	5.71	22.34	11.42	29.68	4.80
F-San Francisco 1-LB (0-25cm)	1.67	0.42	458.26	5.91	32.04	1.54	44.25	7.20
F-San Francisco 1-LB (25-50cm)	1.82	0.15	492.71	3.92	32.98	6.05	51.79	4.67
F-San Francisco 1-R8 (0-25cm)	2.23	0.45	540.82	3.19	23.44	4.12	38.98	5.05
F-San Francisco 1-R8 (25-50cm)	1.85	0.50	454.19	4.19	29.89	3.39	43.68	4.72
F-San Francisco 2 roca	6.43	0.47	1547.93	2.35	5.20	6.13	41.61	5.89
F-San Francisco 2-A (0-5cm)	0.80	0.57	292.60	2.11	18.91	2.11	23.77	8.19
F-San Francisco 2-A (5-25cm)	0.76	0.39	247.56	7.78	17.47	6.40	21.16	1.00
F-San Francisco 2-A (25-45cm)	0.85	0.58	212.49	3.31	17.09	12.33	21.12	10.70
F-San Francisco 2-LB (0-5cm)	1.52	0.45	372.44	0.77	19.71	5.28	36.27	3.25
F-San Francisco 2-LB (5-25cm)	1.74	0.49	565.81	1.25	22.82	7.56	37.88	4.03
F-San Francisco 2-LB (25-40cm)	1.78	0.69	396.95	3.55	21.70	1.82	39.82	12.04
F-San Francisco 2-RB (0-5cm)	1.05	0.11	291.39	1.87	17.90	8.61	25.43	5.04
F-San Francisco 2-RB (5-25cm)	0.90	0.51	276.82	1.65	20.12	7.77	24.20	4.48
F-San Francisco 2-RB (25-50cm)	0.78	0.54	314.13	2.04	16.45	2.05	25.14	4.92
F-San Francisco 3A (5-25cm)	0.79	0.32	231.91	7.56	19.02	10.18	23.80	12.01
F-San Francisco 3A (25-40cm)	0.76	0.54	210.33	9.65	17.51	9.49	20.61	4.61
F-San Francisco 3-LB (0-5cm)	0.74	0.07	226.42	10.45	17.94	4.14	23.09	12.66
F-San Francisco 3-LB (5-25cm)	1.29	0.49	311.84	2.67	18.93	4.26	27.94	9.47
F-San Francisco 3-LB (25-50cm)	1.51	0.45	378.25	2.87	21.30	2.80	33.48	8.56
F-San Francisco 3-RB (0-5cm)	1.50	0.39	355.81	5.66	21.59	9.32	34.69	4.35
F-San Francisco 3-RB (5-25cm)	0.98	0.70	262.23	2.35	17.87	0.78	25.29	6.31
F-San Francisco 3-RB (25-50cm)	1.25	1.01	292.88	3.82	17.19	3.98	26.99	0.59
F-San Francisco 3 roca	1.47	0.86	337.23	4.52	20.01	10.49	28.79	15.44
F.La junta A(5cm)	2.04	0.57	409.52	6.11	17.20	5.37	46.98	4.31
F.La junta A(25cm)	1.81	0.19	382.98	3.47	17.11	4.96	54.05	5.21
F.La junta A(50cm)	1.85	0.15	366.49	10.70	16.50	10.33	52.48	2.86

NA= No aplica <LOD= Debajo del límite de detección.



CONTROL DE CALIDAD

pH y CE:

Para la precisión de los análisis de pH se determinaron algunas mediciones por duplicado reportando un %DPR de las mediciones (menor al 10%).

ID campo	pH	CE	%DPR pH	%DPR CE
F. La Junta 3A (25)	8.52	34.4	3.01	3.71
	8.78	35.7		
F-S Gertrudis 3(25-50)	38.3	7.8	1.58	0.13
	37.7	7.79		
F. Mazocahui 3	6.25	25.6	0.00	8.96
	6.25	28		
F. Bacanuchi I3 (25-50)	8.72	39.8	1.04	9.47
	8.63	36.2		
F. San Francisco 1-A (0-5)	8.77	39.2	1.15	3.51
	8.67	40.6		

FRX:

Para la precisión de los análisis de FRX las mediciones se determinaron por triplicado, el valor reportado es el promedio de las tres determinaciones reportando también el % del coeficiente de variación (CV) de las mediciones (menor al 20%).

Para determinar la exactitud en FRX se utilizaron estándares certificados (TILL-4 y NIST-2710a) como control analítico los cuales fueron analizados como muestra para determinar su concentración las concentraciones se encontraron entre el 84 y el 112% lo cual indica un buen desempeño del método de análisis.

Estándares	%Exactitud							
	As	Ba	Cu	Cr	Fe	Mn	Pb	Zn
TILL-4	96.10	99.53	96.15	108.7	83.14	84.02	103.7	NA
NIST-2710a	100.7	NA	92.1	96.7	112.8	94.98	100.7	99.05



Laboratorio Nacional de Geoquímica y Minerología
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Geoquímica Ambiental



Sin mas por al momento quedo a sus ordenes.

Analistas:

Responsable tecnico:

QFB. Fabiola Vega Garcia

M en C Luis Gerardo Martinez Jardines

M en C Alicia Santana Silva

QA. Daniel Ramos Pérez

Victor Guillermo Montaño Jiménez



INFORME DE RESULTADOS

Valores de fondo

SUELOS Y SEDIMENTOS SAN MIGUEL

2015

Información de las muestras

Se analizaron 169 muestras de suelos y sedimentos de fondo de San Miguel.

Las muestras se recibieron tamizadas por malla N° 10 en bolsas de plástico de 25X10 cm, etiquetadas como SM-S-1 a la SM-S-20 A, LB y RB, así como un listado de coordenadas y observaciones adjunto.

En el laboratorio de Geoquímica Ambiental las muestras fueron homogeneizadas y molidas en mortero de ágata para su análisis por FRX

Información de los análisis

El pH se determinó con un potenciómetro Hanna Instruments, HI-98185 y se siguió el método estandarizado 9040 C de la US-EPA.

Conductividad eléctrica (CE) se determinó con un conductímetro OAKTON Con 700. y se siguió el método APHA 1992. Standard methods for the examination of water and wastewater.

Fluorescencia de rayos X. El análisis se determinó con un equipo de Fluorescencia de Rayos X, NITTON FXL 950 de Thermo Scientific y se siguió el método EPA 6200. La determinación fue realizada por triplicado con un tiempo de medición de 90s en el modo de suelo y 31 s en el modo de mina para Fe. Los elementos cuantificados en cada determinación se reportan en mg/kg (ppm) para el modo de suelo y (%) para el modo de mina

Limites de detección:

LD (mg/Kg)	As	Cd	Cu	Mn	Ni	Pb	Sr	Zn	Fe (%)
	5	6	9	40	15	6	2	7	0.1



Listado de recepción de muestras:

ID/MUESTRA	X	Y	ID/MUESTRA	X	Y
SM S 1A (0-5)	543627	3392790	SM S-SA (0-5)	527010	3360001
SM-S-1LB (0-5)	543620	3392798	SM-S-5A (5-25)	527010	3360001
SM-S-1LB (5-25)	543620	3392798	SM-S-5A (25-50)	527010	3360001
SM-S-1LB (25-50)	543620	3392798	SM-S-5LB(0-5)	526990	3360000
SM-S-1RB(0-5)	543635	3392762	SM S-5LB(5-25)	526990	3360000
SM-S-1RB (5-25)	543635	3392762	SM-S-5LB (25-50)	526990	3360000
SM-S-1RB (25-50)	543635	3392762	SM-S-5RB (0-5)	527040	3359997
SM-S-2A(0-5)	536905	3386582	SM-S-5RB (5-25)	527040	3359997
SM-S-2A(5-25)	536905	3386582	SM-S-5RB (25-50)	527040	3359997
SM-S-2A (25-50)	536905	3386582	SM S-6A (0-5)	527170	3350061
SM-S-2LB(0-5)	536910	3386599	SM-S-6A (15)	527170	3350061
SM-S-2LB (5-25)	536910	3386599	SM-S-6LB (0-5)	527210	3350037
SM-S-2LB(25-50)	536910	3386599	SM-S-6LB (5-25)	527210	3350037
SM-S-2RB (0-5)	536901	3386575	SM-S-6LB (25-50)	527210	3350037
SM-S-2RB (5-25)	536901	3386575	SM S-6RB(0-5)	527140	3350077
SM-S-2RB (25-50)	536901	3386575	SM S-6RB(5-25)	527140	3350077
SM-S-3A (0-5)	530788	3379275	SM S-6RB(25-50)	527140	3350077
SM-S-3A (5-25)	530788	3379275	SM-S-7A (0-5)	529430	3339316
SM-S-3A (25_50)	530788	3379275	SM-S-7A (5-25)	529430	3339316
SM-S-3LB (0-5)	530780	3379286	SM-S-7A (25-50)	529430	3339316
SM-S-3LB (5-25)	530780	3379286	SM-S-7LB (0-5)	529450	3339310
SM-S-3LB (25-50)	530780	3379286	SM-S-7LB (5-25)	529450	3339310
SM-S-3RB (0-5)	530809	3379275	SM-S-7LB (25-50)	529450	3339310
SM-S-3RB (5-25)	530809	3379275	SM S-7RB (0-5)	529390	3339334
SM-S-3RB (25-50)	530809	3379275	SM-S-7RB (5-25)	529390	3339334
SM-S-4A (0-5)	528385	3369711	SM-S-7RB (25-50)	529390	3339334
SM-S-4A (5-25)	528385	3369711	SM-S-8A (0-5)	529900	3328375
SM-S-4A (25-50)	528385	3369711	SM-S-8A (5-25)	529900	3328375
SM-S-4LB(0-5)	528356	3369711	SM-S-8A (25-50)	529900	3328375
SM-S-4LB (5-25)	528356	3369711	SM-S-8LB (0-5)	529831	3328198
SM-S-4LB (25-50)	528356	3369711	SM-S-8LB (5-25)	529831	3328198
SM-S-4RB (0-5)	528416	3369712	SM-S-8LB (25-50)	529831	3328198
SM-S-4RB (5-25)	528416	3369712	SM S-8RB (0-5)	529884	3328424
SM-S-4RB (25-50)	528416	3369712	SM S-8RB (5-25)	529884	3328424



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Universidad Nacional Autónoma de México
Departamento de Geoquímica
Laboratorio de Geoquímica Ambiental



ID/MUESTRA	X	Y	ID/MUESTRA	X	Y
SM-S-8RB (25-50)	529884	3328424	SM-S-12LB (25-50)	540594	3290963
SM-S-9A (0-5)	532613	3319361	SM-S-12RB (0-5)	540725	3290996
SM-S-9A (5-25)	532613	3319361	SM-S-12RB (5-25)	540725	3290996
SM S-9A (40)	532613	3319361	SM-S-12RB (25-50)	540725	3290996
SM-S-9LB (0-5)	532535	3319353	SM-S-13A (0-5)	541495	3280306
SM-S-9LB (5-25)	532535	3319353	SM-S-13A (5-25)	541495	3280306
SM S-9LB (25-50)	532535	3319353	SM S-13A (25-50)	541495	3280306
SM S-9RB (0-5)	532963	3319319	SM-S-13LB (0-5)	541442	3280253
SM-S-9RB (5-25)	532963	3319319	SM-S-13LB (5-25)	541442	3280253
SM-S-9RB (25-50)	532963	3319319	SM-S-13LB (25-50)	541442	3280253
SM-S-10A (0-5)	536133	3309783	SM-S-13RB (25-50)	541614	3280311
SM-S-10A (5-25)	536133	3309783	SM-S-13RB (5-25)	541614	3280311
SM-S-10A (25-50)	536133	3309783	SM-S-13RB (25-50)	541614	3280311
SM-S-10LB (0-5)	536005	3309758	SM-S-14A (0-5)	542125	3272794
SM-S-10LB (5-25)	536005	3309758	SM S-14A (5-25)	542125	3272794
SM-S-10LB (25-50)	536005	3309758	SM-S-14A (25-50)	542125	3272794
SM-S-10RB (0-5)	536133	3309783	SM-S-14LB (0-5)	542110	3272837
SM-S-10RB (5-25)	536133	3309783	SM-S-14LB (5-25)	542110	3272837
SM-S-10RB (25-50)	536133	3309783	SM-S-14RB (0-5)	542288	3272695
SM-S-11A (0-5)	539026	3301121	SM-S-14RB (5-25)	542288	3272695
SM-S-11A (5-25)	539026	3301121	SM-S-14RB (25-45)	542288	3272695
SM-S-11A (25-50)	539026	3301121	SM-S-15A (0-5)	525978	3262934
SM-S-11LB (0-5)	539004	3301121	SM S-15A (5-25)	525978	3262934
SM-S-11LB (5-25)	539004	3301121	SM S-15A (25-50)	525978	3262934
SM-S-11LB (25-50)	539004	3301121	SM-S-15LB (0-5)	525935	3263025
SM-S-11RB (0-5)	539027	3301137	SM-S-15LB (5-25)	525935	3263025
SM-S-11RB (5-25)	539027	3301137	SM-S-15LB (25-40)	525935	3263025
SM-S-11RB (25-50)	539027	3301137	SM-S-15RB (0-5)	526064	3262132
SM-S-12A (0-5)	540691	3290969	SM-S-15RB (5-25)	526064	3262132
SM S-12A (5-25)	540691	3290969	SM-S-15RB (25-50)	526064	3262132
SM-S-12A (25-50)	540691	3290969	SM-S-16A (0-5)	526023	3263020
SM-S-12LB (0-5)	540594	3290963	SM-S-16LB (0-5)	526016	3263028
SM-S-12LB (5-25)	540594	3290963	SM S 16LB (5-25)	526016	3263028



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Universidad Nacional Autónoma de México
Departamento de Geoquímica
Laboratorio de Geoquímica Ambiental



ID/MUESTRA	X	Y	ID/MUESTRA	X	Y
SM-S-16LB (25-50)	526016	3263028	SM-S-19A (0-5)	512160	3239106
SM-S-16RB (0-5)	526031	3263001	SM-S-19A (5-25)	512160	3239106
SM-S-16RB (5-25)	526031	3263001	SM S-19A (25-50)	512160	3239106
SM-S-16RB (25-50)	526031	3263001	SM-S-19LB (0-5)	512128	3239090
SM-S-17A (0-5)	522413	3256324	SM S-19LB (5-25)	512128	3239090
SM-S-17LB (0-5)	522393	3256333	SM S-19LB (25-50)	512128	3239090
SM-S-17LB (5-25)	522393	3256333	SM S-19RB (0-5)	512185	3239113
SM-S-17LB (25-50)	522393	3256333	SM S-19RB (5-25)	512185	3239113
SM-S-17RB (0-5)	522447	3256304	SM S-19RB (25-50)	512185	3239113
SM-S-17RB (5-25)	522447	3256304	SM-S-20A (0-5)	512429	3229654
SM-S-17RB (25-50)	522447	3256304	SM-S-20A (5-25)	512429	3229654
SM-S-18A (0-5)	516581	3247406	SM-S-20A (25-50)	512429	3229654
SM-S-18LB (0-5)	516572	3247479	SM-S-20LB (0-5)	512430	3229699
SM-S-18LB (5-25)	516572	3247479	SM-S-20LB (5-25)	512430	3229699
SM-S-18LB (25-50)	516572	3247479	SM-S-20LB (25-50)	512430	3229699
SM-S-18RB (0-5)	516598	3247420	SM-S 20RB (0-5)	512440	3229546
SM S-18RB (5-25)	516598	3247420	SM-S-20RB (5-25)	512440	3229546
SM-S-18RB (25-50)	516598	3247420	SM-S-20RB (25-50)	512440	3229546

Resultados de pH y CE:

muestra	pH	CE(μs/cm)	muestra	pH	CE(μs/cm)
SM S 1A (0-5)	8.83	50.3	SM-S-2A(5-25)	8.53	40.1
SM-S-1LB (0-5)	8.17	68.4	SM-S-2A (25-50)	8.73	38.6
SM-S-1LB (5-25)	8.23	65.4	SM-S-2LB(0-5)	8.31	53.3
SM-S-1LB (25-50)	8.05	90.8	SM-S-2LB (5-25)	8.35	63.1
SM-S-1RB(0-5)	7.27	62.8	SM-S-2LB(25-50)	8.62	63.3
SM-S-1RB (5-25)	7.13	67.1	SM-S-2RB (0-5)	8.23	46
SM-S-1RB (25-50)	7.32	64	SM-S-2RB (5-25)	8.58	43
SM-S-2A(0-5)	8.63	40	SM-S-2RB (25-50)	8.57	40.8



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Universidad Nacional Autónoma de México
Departamento de Geoquímica
Laboratorio de Geoquímica Ambiental



muestra	pH	CE(μs/cm)	muestra	pH	CE(μs/cm)
SM-S-3A (0-5)	8.74	35.8	SM-S-7LB (0-5)	8.07	22
SM-S-3A (5-25)	8.24	44.3	SM-S-7LB (5-25)	7.61	80.5
SM-S-3A (25-50)	8.63	39.9	SM-S-7LB (25-50)	7.89	132
SM-S-3LB (0-5)	8.22	64.8	SM S-7RB (0-5)	7.39	76.2
SM-S-3LB (5-25)	8.39	91.5	SM-S-7RB (5-25)	7.77	61.9
SM-S-3LB (25-50)	8.46	40.9	SM-S-7RB (25-50)	7.65	81.5
SM-S-3RB (0-5)	8.55	53.5	SM-S-8A (0-5)	8.15	58.9
SM-S-3RB (5-25)	8.66	47.5	SM-S-8A (5-25)	7.98	26.6
SM-S-3RB (25-50)	8.58	54.3	SM-S-8A (25-50)	8.52	24.2
SM-S-4A (0-5)	8.33	29.1	SM-S-8LB (0-5)	7.54	71.6
SM-S-4A (5-25)	8.72	28.5	SM-S-8LB (5-25)	7.51	49
SM-S-4A (25-50)	7.93	30	SM-S-8LB (25-50)	7.8	71
SM-S-4LB(0-5)	7.69	79.3	SM S-8RB (0-5)	7.87	54.7
SM-S-4LB (5-25)	8.11	41	SM S-8RB (5-25)	8.47	71.1
SM-S-4LB (25-50)	8.8	62	SM-S-8RB (25-50)	8.15	32
SM-S-4RB (0-5)	8.08	85.6	SM-S-9A (0-5)	8.1	176
SM-S-4RB (5-25)	7.56	38.8	SM-S-9A (5-25)	8.33	98
SM-S-4RB (25-50)	8.55	21.4	SM S-9A (40)	8.02	191
SM S-5A (0-5)	7.93	46.9	SM-S-9LB (0-5)	7.86	155
SM-S-5A (5-25)	7.79	33.6	SM-S-9LB (5-25)	8.22	58.4
SM-S-5A (25-50)	7.88	34.4	SM S-9LB (25-50)	8.95	55.5
SM-S-5LB(0-5)	8.31	68.5	SM S-9RB (0-5)	6.03	55.2
SM S-5LB(5-25)	8.73	80.1	SM-S-9RB (5-25)	8.37	41.6
SM-S-5LB (25-50)	8.79	79.3	SM-S-9RB (25-50)	8.61	52.8
SM-S-5RB (0-5)	8.27	42.1	SM-S-10A (0-5)	8.85	38.2
SM-S-5RB (5-25)	7.98	37.8	SM-S-10A (5-25)	8.63	29.2
SM-S-5RB (25-50)	8.44	51.3	SM-S-10A (25-50)	8.56	25.9
SM S-6A (0-5)	8.12	44.9	SM-S-10LB (0-5)	8.07	55
SM-S-6A (15)	8.24	42.3	SM-S-10LB (5-25)	8.74	53.3
SM-S-6LB (0-5)	7.94	52.8	SM-S-10LB (25-50)	8.88	45.6
SM-S-6LD (5-25)	8.32	37.2	SM-S-10RB (0-5)	7.44	71
SM-S-6LB (25-50)	8.4	23	SM-S-10RB (5-25)	9.12	69
SM S-6RB(0-5)	7.57	386	SM-S-10RB (25-50)	9.68	69.2
SM S-6RB(5-25)	7.62	206	SM-S-11A (0-5)	7.66	36.8
SM S-6RB(25-50)	7.53	223	SM-S-11A (5-25)	7.65	20.8
SM-S-7A (0-5)	8.11	65.2	SM-S-11A (25-50)	8.24	17
SM-S-7A (5-25)	8.15	46	SM-S-11LB (0-5)	7.07	85.7
SM-S-7A (25-50)	8.12	35.2	SM-S-11LB (5-25)	8.68	36



Instituto de Geología
Universidad Nacional Autónoma de México
Departamento de Geoquímica
Laboratorio de Geoquímica Ambiental



muestra	pH	CE($\mu\text{s/cm}$)	muestra	pH	CE($\mu\text{s/cm}$)
SM-S-11LB (25-50)	8.32	41	SM-S-16LB (0-5)	7.61	72.8
SM-S-11RB (0-5)	7.9	56.2	SM S 16LB (5-25)	8.6	45
SM-S-11RB (5-25)	8.38	28	SM-S-16LB (25-50)	8.15	60.8
SM-S-11RB (25-50)	8.68	58	SM-S-16RB (0-5)	7.68	61.6
SM-S-12A (0-5)	7.8	30.7	SM-S-16RB (5-25)	7.5	35.5
SM S-12A (5-25)	7.58	25.6	SM-S-16RB (25-50)	7.66	34.1
SM-S-12A (25-50)	7.55	17.53	SM-S-17A (0-5)	8.07	48.8
SM-S-12LB (0-5)	8.36	132.7	SM-S-17LB (0-5)	7.82	157.7
SM-S-12LB (5-25)	8.27	102.1	SM-S-17LB (5-25)	8.18	441
SM-S-12LB (25-50)	8.6	96.9	SM-S-17LB (25-50)	8.14	459
SM-S-12RB (0-5)	7.98	49	SM-S-17RB (0-5)	7.73	284
SM-S-12RB (5-25)	7.36	17.99	SM-S-17RB (5-25)	8.23	63.9
SM-S-12RB (25-50)	8.32	15	SM-S-17RB (25-50)	8.39	56.1
SM-S-13A (0-5)	8.67	53.2	SM-S-18A (0-5)	8.91	46.9
SM-S-13A (5-25)	8.23	24	SM-S-18LB (0-5)	8.15	117.7
SM S-13A (25-50)	8.59	55	SM-S-18LB (5-25)	8.64	74.5
SM-S-13LB (0-5)	7.25	51.7	SM-S-18LB (25-50)	8.3	93.2
SM-S-13LB (5-25)	7.94	65.9	SM-S-18RB (0-5)	7.35	76.2
SM-S-13LB (25-50)	7.69	73.7	SM S-18RB (5-25)	8.43	77
SM-S-13RB (0-5)	8.27	118.6	SM-S-18RB (25-50)	8.51	79
SM-S-13RB (25-50)	7.02	19.79	SM-S-19A (0-5)	7.33	19.4
SM-S-14A (0-5)	8.5	31.3	SM-S-19A (5-25)	7.41	27.2
SM S-14A (5-25)	8.38	55.7	SM S-19A (25-50)	8.48	32.8
SM-S-14A (25-50)	8.26	30	SM-S-19LB (0-5)	8.33	86.6
SM-S-14LB (0-5)	7.84	106.9	SM S-19LB (5-25)	8.6	80.4
SM-S-14LB (5-25)	8.52	121	SM S-19LB (25-50)	8.61	61.2
SM-S-14RB (0-5)	7.03	115.9	SM S-19RB (0-5)	8.86	80.6
SM-S-14RB (5-25)	8.39	65	SM S-19RB (5-25)	7.77	1380
SM-S-14RB (25-50)	8.53	75	SM S-19RB (25-50)	8	1260
SM-S-15A (0-5)	8.1	24.2	SM-S-20A (0-5)	7.95	30.2
SM S-15A (5-25)	8.56	24.8	SM-S-20A (5-25)	7.8	35.5
SM S-15A (25-50)	8.42	28.5	SM-S-20A (25-50)	7.51	26.6
SM-S-15LB (0-5)	8.74	109.3	SM-S-20LB (0-5)	7.35	34.2
SM-S-15LB (5-25)	8.55	148.2	SM-S-20LB (5-25)	8.35	53
SM-S-15LB (25-40)	8.33	306	SM-S-20LB (25-50)	8.69	43
SM-S-15RB (0-5)	7.79	94.3	SM-S 20RB (0-5)	7.41	46.3
SM-S-15RB (5-25)	8.71	74	SM-S-20RB (5-25)	8.56	53.8
SM-S-15RB (25-50)	8.33	85.5	SM-S-20RB (25-50)	8.78	58.7
SM-S-16A (0-5)	8.1	139.8			



Instituto de Geología
Universidad Nacional Autónoma de México
Departamento de Geoquímica
Laboratorio de Geoquímica Ambiental



Resultados de FRX :

muestra	As		Cd		Cu		Mn		Ni	
	mg/Kg	% CV	mg/Kg	% CV	mg/Kg	% CV	mg/Kg	% CV	mg/Kg	% CV
SM S 1A (0-5)	8.17	5.12	< LOD	NA	41.95	7.57	413.42	3.54	27.50	4.40
SM-S-1LB (0-5)	20.59	4.02	< LOD	NA	48.16	12.30	449.28	4.38	32.94	14.97
SM-S-1LB (5-25)	17.06	0.86	< LOD	NA	44.51	14.53	558.78	4.94	33.09	9.63
SM-S-1LB (25-50)	18.18	2.72	< LOD	NA	43.83	6.26	500.77	4.09	31.79	7.76
SM-S-1RB(0-5)	14.90	13.08	< LOD	NA	39.19	7.17	428.96	1.89	17.40	15.08
SM-S-1RB (5-25)	18.61	4.60	< LOD	NA	52.63	0.44	569.73	1.64	28.33	10.29
SM-S-1RB (25-50)	18.56	6.39	< LOD	NA	53.78	7.65	573.81	3.17	20.52	10.42
SM-S-2A(0-5)	18.57	10.35	< LOD	NA	47.92	7.00	421.25	7.08	33.73	13.70
SM-S-2A(5-25)	22.69	2.32	< LOD	NA	44.11	8.53	525.70	1.72	36.99	20.20
SM-S-2A (25-50)	26.73	5.13	< LOD	NA	43.02	11.44	600.61	0.80	39.55	7.30
SM-S-2LB(0-5)	22.93	6.33	< LOD	NA	45.36	8.49	579.45	1.36	32.03	17.21
SM-S-2LB (5-25)	24.13	0.71	< LOD	NA	44.39	5.46	424.20	3.43	33.22	6.49
SM-S-2LB(25-50)	14.71	15.67	< LOD	NA	40.15	9.33	356.56	5.22	28.14	4.17
SM-S-2RB (0-5)	14.28	3.33	< LOD	NA	41.61	9.20	446.82	0.87	29.23	7.59
SM-S-2RB (5-25)	13.26	6.87	< LOD	NA	37.18	6.08	365.93	3.88	35.27	9.29
SM-S-2RB (25-50)	12.02	5.93	< LOD	NA	34.63	7.83	406.57	3.11	27.93	12.39
SM-S-3A (0-5)	11.27	7.34	< LOD	NA	37.65	10.92	353.87	1.41	37.93	5.61
SM-S-3A (5-25)	14.35	5.21	< LOD	NA	35.05	6.42	407.32	5.31	32.50	10.06
SM-S-3A (25_50)	13.13	7.95	< LOD	NA	36.25	10.85	349.05	2.90	32.50	0.21
SM-S-3LB (0-5)	18.79	6.76	< LOD	NA	50.36	4.13	711.75	3.22	32.37	6.39
SM-S-3LB (5-25)	18.68	4.01	< LOD	NA	48.74	8.67	710.62	2.33	39.01	9.98
SM-S-3LB (25-50)	21.41	1.56	< LOD	NA	47.45	1.66	701.53	1.78	37.80	18.67
SM-S-3RB (0-5)	17.66	4.08	< LOD	NA	34.02	1.65	517.65	6.22	32.27	7.08
SM-S-3RB (5-25)	18.19	11.27	< LOD	NA	39.26	3.10	563.27	1.54	35.08	10.49
SM-S-3RB (25-50)	16.88	13.92	< LOD	NA	36.68	4.70	530.09	1.55	34.47	11.81
SM-S-4A (0-5)	6.73	16.32	< LOD	NA	32.05	9.23	271.64	6.06	33.76	10.63
SM-S-4A (5-25)	<LOD	NA	< LOD	NA	24.96	8.93	187.25	5.69	27.31	8.86
SM-S-4A (25-50)	7.23	15.88	< LOD	NA	38.16	8.68	331.25	3.61	25.28	5.87
SM-S-4LB(0-5)	10.66	4.73	< LOD	NA	45.47	8.49	724.43	2.84	29.24	15.67
SM-S-4LB (5-25)	9.90	15.38	< LOD	NA	34.80	10.31	482.52	1.28	28.79	25.87
SM-S-4LB (25-50)	11.26	4.65	< LOD	NA	41.21	12.36	558.39	3.03	33.04	2.16
SM-S-4RB (0-5)	13.35	12.49	< LOD	NA	39.61	5.27	472.51	3.80	29.61	8.11
SM-S-4RB (5-25)	8.77	2.90	< LOD	NA	31.15	5.87	342.55	6.71	30.30	3.78
SM-S-4RB (25-50)	5.20	3.13	< LOD	NA	30.06	9.33	292.17	2.95	30.59	6.32
SM S-5A (0-5)	18.20	5.90	< LOD	NA	33.82	9.19	333.13	3.32	31.11	11.03
SM-S-5A (5-25)	17.72	11.73	< LOD	NA	34.71	8.90	353.97	11.22	37.26	17.21
SM-S-5A (25-50)	20.88	4.41	< LOD	NA	37.66	6.28	304.77	1.82	28.86	6.05

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Instituto de Geología
Universidad Nacional Autónoma de México
Departamento de Geoquímica
Laboratorio de Geoquímica Ambiental



muestra	Pb		Sr		Zn		Fe	
	mg/Kg	% CV	mg/Kg	% CV	mg/Kg	% CV	%	% CV
SM S 1A (0-5)	23.67	2.95	263.33	0.48	53.54	5.79	1.67	0.61
SM-S-1LB (0-5)	79.03	0.86	151.75	0.87	54.28	2.56	2.02	0.22
SM-S-1LB (5-25)	22.71	3.92	161.59	0.41	51.99	1.75	2.17	0.35
SM-S-1LB (25-50)	15.45	6.56	135.56	1.08	50.24	5.14	1.94	0.56
SM-S-1RB(0-5)	19.30	11.85	137.74	0.55	46.86	7.68	1.93	0.47
SM-S-1RB (5-25)	27.66	2.61	147.57	0.32	53.19	5.83	2.15	0.31
SM-S-1RB (25-50)	28.35	5.60	154.01	0.72	54.79	10.23	2.18	0.41
SM-S-2A(0-5)	17.45	7.29	135.77	0.91	42.29	3.19	2.49	0.46
SM-S-2A(5-25)	16.94	8.23	123.61	0.48	43.83	4.99	2.31	0.52
SM-S-2A (25-50)	15.59	0.72	133.58	0.37	50.82	1.47	2.50	0.07
SM-S-2LB(0-5)	16.64	11.41	115.87	0.33	49.95	3.57	1.84	0.19
SM-S-2LB (5-25)	13.65	12.56	84.99	1.22	45.48	5.72	2.08	0.67
SM-S-2LB(25-50)	12.65	12.41	99.02	1.14	37.12	3.14	1.67	0.17
SM-S-2RB (0-5)	16.45	2.65	72.19	0.44	37.37	6.49	1.78	0.24
SM-S-2RB (5-25)	9.48	4.65	70.24	1.15	33.73	10.28	1.62	0.43
SM-S-2RB (25-50)	11.81	4.22	68.42	1.48	35.52	5.51	1.70	0.83
SM-S-3A (0-5)	14.26	3.83	146.01	1.64	31.78	1.61	1.63	0.37
SM-S-3A (5-25)	15.21	5.84	171.84	0.70	43.34	13.00	1.78	0.16
SM-S-3A (25_50)	16.20	4.95	128.61	0.55	26.51	9.72	1.67	0.14
SM-S-3LB (0-5)	23.21	5.52	210.12	0.62	62.49	1.99	2.38	0.15
SM-S-3LB (5-25)	21.67	1.69	240.51	0.19	58.70	3.98	2.40	0.28
SM-S-3LB (25-50)	27.06	7.49	245.97	0.96	74.40	3.56	2.74	0.60
SM-S-3RB (0-5)	19.22	3.93	165.50	1.95	45.38	0.68	2.00	0.22
SM-S-3RB (5-25)	19.88	5.83	176.63	0.57	51.41	2.20	2.15	0.23
SM-S-3RB (25-50)	20.07	5.12	156.10	0.73	48.23	1.36	1.92	0.56
SM-S-4A (0-5)	21.62	4.97	382.06	0.68	23.60	3.94	1.12	0.72
SM-S-4A (5-25)	20.30	8.35	421.83	0.52	15.37	12.66	0.59	0.18
SM-S-4A (25-50)	17.71	4.84	369.11	0.34	25.40	9.32	1.06	0.54
SM-S-4LB(0-5)	42.01	1.39	247.56	0.15	185.50	1.31	1.60	0.43
SM-S-4LB (5-25)	24.45	8.24	437.38	0.35	52.70	4.98	1.16	0.43
SM-S-4LB (25-50)	28.13	8.37	319.61	0.78	56.56	4.19	1.64	0.42
SM-S-4RB (0-5)	20.94	7.47	287.62	1.07	48.52	0.81	1.78	0.40
SM-S-4RB (5-25)	20.30	7.45	338.27	0.30	32.85	5.25	1.28	0.44
SM-S-4RB (25-50)	17.34	14.46	417.17	0.53	24.83	4.15	1.15	0.25
SM S-5A (0-5)	18.37	7.46	304.10	0.64	50.84	2.68	1.38	0.49
SM-S-5A (5-25)	13.85	6.13	349.07	0.13	43.56	1.90	1.78	0.01
SM-S-5A (25-50)	15.08	2.37	308.11	1.75	41.22	5.98	1.55	0.82

NA= No aplica

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Instituto de Geología
Universidad Nacional Autónoma de México
Departamento de Geoquímica
Laboratorio de Geoquímica Ambiental



muestra	As		Cd		Cu		Mn		Ni	
	mg/Kg	% CV	mg/Kg	% CV	mg/Kg	% CV	mg/Kg	% CV	mg/Kg	% CV
SM-S-5LB(0-5)	28.74	2.10	< LOD	NA	42.92	6.52	636.67	4.35	41.40	7.33
SM S-5LB(5-25)	31.79	7.88	< LOD	NA	40.17	10.71	621.20	2.97	40.87	3.62
SM-S-5LB (25-50)	29.39	8.02	< LOD	NA	41.94	8.46	630.39	3.17	37.40	9.56
SM-S-5RB (0-5)	19.41	4.74	< LOD	NA	44.96	7.59	466.97	1.35	39.92	8.70
SM-S-5RB (5-25)	19.97	8.07	< LOD	NA	44.31	1.91	459.63	7.06	37.79	9.81
SM-S-5RB (25-50)	24.80	3.43	< LOD	NA	46.30	12.54	439.59	5.83	33.87	19.58
SM S-6A (0-5)	14.55	6.77	< LOD	NA	38.55	13.65	267.41	3.71	33.41	8.54
SM-S-6A (15)	16.73	2.85	< LOD	NA	40.99	7.42	320.49	2.53	28.26	4.99
SM-S-6LB (0-5)	27.83	5.53	< LOD	NA	44.21	10.72	450.83	0.33	39.35	10.58
SM-S-6LD (5-25)	25.65	3.23	< LOD	NA	42.24	10.42	343.72	1.08	37.03	1.31
SM-S-6LB (25-50)	20.26	1.96	< LOD	NA	43.53	5.07	354.78	4.06	46.27	7.24
SM S-6RB(0-5)	20.53	7.00	< LOD	NA	42.34	13.99	460.34	0.41	31.74	7.19
SM S-6RB(5-25)	29.26	1.31	< LOD	NA	46.48	3.97	583.48	2.81	30.96	9.47
SM S-6RB(25-50)	31.10	2.21	< LOD	NA	49.75	6.44	477.54	4.49	37.08	11.76
SM-S-7A (0-5)	17.23	4.55	< LOD	NA	33.51	15.72	345.51	5.13	38.52	6.13
SM-S-7A (5-25)	23.83	1.49	< LOD	NA	42.06	8.73	263.54	5.75	26.32	6.45
SM-S-7A (25-50)	18.38	2.17	< LOD	NA	40.69	6.05	504.44	3.19	34.19	11.00
SM-S-7LB (0-5)	21.17	2.87	< LOD	NA	44.49	10.06	475.74	1.29	43.10	2.87
SM-S-7LB (5-25)	13.62	7.26	< LOD	NA	40.40	9.96	366.20	13.03	39.07	6.35
SM-S-7LB (25-50)	21.37	5.37	< LOD	NA	46.60	11.75	550.59	4.22	33.02	9.97
SM S-7RB (0-5)	26.34	6.33	< LOD	NA	49.47	6.58	421.57	0.38	34.87	5.26
SM-S-7RB (5-25)	26.64	1.09	< LOD	NA	50.76	7.16	563.17	2.05	37.41	4.82
SM-S-7RB (25-50)	44.76	4.76	< LOD	NA	46.39	7.55	480.88	4.20	37.61	7.79
SM-S-8A (0-5)	20.63	5.61	< LOD	NA	38.86	5.02	398.35	1.01	43.61	4.16
SM-S-8A (5-25)	16.51	1.99	< LOD	NA	39.44	9.53	335.04	3.67	34.14	19.68
SM-S-8A (25-50)	11.72	3.86	< LOD	NA	35.84	6.85	267.43	3.21	31.47	5.93
SM-S-8LB (0-5)	9.05	11.57	< LOD	NA	38.49	9.80	493.22	3.86	28.49	5.71
SM-S-8LB (5-25)	8.34	0.25	< LOD	NA	41.60	13.31	458.20	3.61	33.27	16.18
SM-S-8LB (25-50)	8.47	15.12	< LOD	NA	41.40	5.54	428.07	1.43	33.23	11.59
SM S-8RB (0-5)	11.78	4.71	< LOD	NA	45.56	10.90	416.03	3.04	33.58	12.03
SM S-8RB (5-25)	10.84	3.60	< LOD	NA	43.08	2.98	526.90	1.58	30.02	6.36
SM-S-8RB (25-50)	13.19	5.31	< LOD	NA	37.21	2.38	544.15	1.70	32.38	12.22
SM-S-9A (0-5)	20.56	5.61	< LOD	NA	42.07	6.94	381.66	5.23	30.33	10.08
SM-S-9A (5-25)	28.88	5.75	< LOD	NA	51.49	8.57	574.85	2.59	25.55	14.89
SM S-9A (40)	28.74	7.09	< LOD	NA	43.16	9.53	561.56	0.56	21.96	9.53
SM-S-9LB (0-5)	3.69	12.65	< LOD	NA	42.95	4.50	437.96	1.56	12.56	15.26
SM-S-9LB (5-25)	<LOD	NA	< LOD	NA	36.39	3.18	403.45	3.77	25.78	10.74
SM S-9LB (25-50)	<LOD	NA	< LOD	NA	27.93	2.52	269.25	1.89	27.66	6.86



Instituto de Geología
Universidad Nacional Autónoma de México
Departamento de Geoquímica
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muestra	Pb		Sr		Zn		Fe	
	mg/Kg	% CV	mg/Kg	% CV	mg/Kg	% CV	%	% CV
SM-S-5LB(0-5)	22.05	6.85	313.88	0.31	57.35	4.29	2.16	0.13
SM S-5LB(5-25)	24.37	4.19	328.25	0.70	56.97	2.95	1.96	0.44
SM-S-5LB (25-50)	22.48	9.22	413.35	0.94	50.83	5.46	2.06	0.40
SM-S-5RB (0-5)	26.03	7.66	250.43	1.05	56.16	4.39	2.36	0.53
SM-S-5RB (5-25)	25.74	3.40	214.34	0.50	56.39	2.25	2.05	0.12
SM-S-5RB (25-50)	28.07	4.92	252.87	0.38	60.41	5.44	2.20	0.44
SM S-6A (0-5)	24.30	2.76	313.89	0.29	39.27	1.96	1.19	0.45
SM-S-6A (15)	23.28	4.95	339.96	0.14	46.71	3.49	1.40	0.06
SM-S-6LB (0-5)	82.14	1.36	375.55	0.22	78.66	2.59	2.01	0.65
SM-S-6LD (5-25)	32.41	5.12	347.71	0.64	62.08	3.79	1.85	0.41
SM-S-6LB (25-50)	26.79	1.53	343.66	0.31	57.12	5.06	1.87	0.23
SM S-6RB(0-5)	31.09	4.17	609.40	0.21	59.77	6.94	1.94	0.41
SM S-6RB(5-25)	32.99	2.11	364.45	0.62	91.89	2.45	2.25	0.48
SM S-6RB(25-50)	29.93	4.30	337.51	0.73	71.81	4.84	2.09	0.19
SM-S-7A (0-5)	23.57	3.03	535.31	0.70	45.61	7.12	1.51	0.66
SM-S-7A (5-25)	19.60	5.22	348.50	0.95	40.42	3.84	1.35	0.24
SM-S-7A (25-50)	25.41	10.95	337.79	0.68	54.91	9.22	1.66	0.43
SM-S-7LB (0-5)	27.08	2.07	366.36	0.41	74.12	1.91	2.37	0.58
SM-S-7LB (5-25)	19.99	5.58	444.91	0.55	45.91	1.22	1.87	0.78
SM-S-7LB (25-50)	22.93	4.02	450.92	0.57	62.85	1.25	2.08	0.30
SM S-7RB (0-5)	32.02	4.64	401.71	0.73	87.65	3.17	2.05	0.60
SM-S-7RB (5-25)	26.22	2.43	411.04	0.68	81.40	3.09	2.25	0.26
SM-S-7RB (25-50)	27.38	5.27	393.71	0.27	68.94	6.95	2.10	0.10
SM-S-8A (0-5)	21.86	5.57	343.83	0.72	54.86	6.18	2.22	0.42
SM-S-8A (5-25)	19.46	6.46	175.42	1.20	47.06	1.75	1.92	0.69
SM-S-8A (25-50)	18.69	5.21	234.39	0.35	52.51	4.35	1.39	0.36
SM-S-8LB (0-5)	30.84	0.85	332.65	0.71	36.52	3.84	1.59	0.12
SM-S-8LB (5-25)	22.44	7.48	368.40	0.82	40.55	3.71	1.58	0.28
SM-S-8LB (25-50)	19.25	6.34	375.41	0.33	41.33	4.90	1.82	0.21
SM S-8RB (0-5)	20.24	5.41	285.72	0.44	50.43	1.22	1.61	0.24
SM S-8RB (5-25)	25.79	8.13	293.37	0.29	55.95	2.53	1.84	0.39
SM-S-8RB (25-50)	23.36	9.35	266.79	0.09	54.15	1.07	1.94	0.31
SM-S-9A (0-5)	23.57	7.19	334.75	0.81	73.10	1.41	1.79	0.27
SM-S-9A (5-25)	30.36	1.61	315.80	0.46	87.36	4.77	2.24	0.59
SM S-9A (40)	26.11	8.86	266.27	0.64	86.34	1.52	2.24	0.56
SM-S-9LB (0-5)	17.04	4.22	291.27	0.82	106.01	1.52	1.18	0.44
SM-S-9LB (5-25)	22.13	1.40	205.12	0.71	39.89	5.97	2.10	0.25
SM S-9LB (25-50)	17.59	6.26	176.39	0.37	19.98	10.17	0.77	0.65



Instituto de Geología
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Departamento de Geoquímica
Laboratorio de Geoquímica Ambiental



muestra	As		Cd		Cu		Mn		Ni	
	mg/Kg	% CV	mg/Kg	% CV	mg/Kg	% CV	mg/Kg	% CV	mg/Kg	% CV
SM-S-9RB (0-5)	4.99	14.70	< LOD	NA	44.79	8.04	513.87	1.19	15.48	9.37
SM-S-9RB (5-25)	3.60	16.33	< LOD	NA	40.67	4.98	457.34	1.89	26.25	9.41
SM-S-9RB (25-50)	4.19	13.69	< LOD	NA	41.89	3.98	441.93	4.85	23.55	10.46
SM-S-10A (0-5)	22.09	4.38	< LOD	NA	31.51	1.93	266.18	5.53	29.38	5.42
SM-S-10A (5-25)	6.26	15.48	< LOD	NA	24.29	2.21	241.89	3.81	26.46	12.52
SM-S-10A (25-50)	6.38	0.00	< LOD	NA	33.60	9.55	265.42	2.94	29.76	9.09
SM-S-10LB (0-5)	21.89	0.94	< LOD	NA	42.84	11.09	375.63	3.45	30.13	7.07
SM-S-10LB (5-25)	19.61	3.99	< LOD	NA	41.07	2.92	425.50	3.18	34.77	7.79
SM-S-10LB (25-50)	12.07	4.55	< LOD	NA	35.90	11.97	317.92	3.69	28.87	11.88
SM-S-10RB (0-5)	5.70	18.37	< LOD	NA	33.70	4.59	380.43	1.58	22.95	13.37
SM-S-10RB (5-25)	17.42	12.64	< LOD	NA	36.58	9.06	383.01	4.62	23.99	15.83
SM-S-10RB (25-50)	8.26	11.82	< LOD	NA	35.83	13.05	389.62	2.99	24.20	4.41
SM-S-11A (0-5)	6.05	8.31	< LOD	NA	26.60	8.82	264.75	1.29	27.21	4.17
SM-S-11A (5-25)	7.98	9.60	< LOD	NA	27.64	0.82	210.41	3.43	27.56	2.06
SM-S-11A (25-50)	10.71	2.26	< LOD	NA	29.86	9.11	226.49	4.36	25.63	5.07
SM-S-11LB (0-5)	11.29	3.01	< LOD	NA	42.77	13.28	446.21	2.37	25.67	9.03
SM-S-11LB (5-25)	8.99	7.65	< LOD	NA	34.92	2.29	437.72	2.93	29.41	5.46
SM-S-11LB (25-50)	6.93	0.71	< LOD	NA	33.84	12.17	350.74	4.27	24.66	7.93
SM-S-11RB (0-5)	16.37	12.17	< LOD	NA	40.19	2.30	369.81	1.26	37.24	6.89
SM-S-11RB (5-25)	10.42	11.64	< LOD	NA	37.18	4.28	309.04	1.48	30.97	10.48
SM-S-11RB (25-50)	15.34	4.48	< LOD	NA	41.77	4.17	314.06	4.68	34.39	3.23
SM-S-12A (0-5)	8.05	1.74	< LOD	NA	28.76	11.43	235.80	8.00	26.74	11.83
SM-S-12A (5-25)	6.41	15.19	< LOD	NA	21.74	10.54	205.76	1.88	24.50	5.08
SM-S-12A (25-50)	6.96	12.38	< LOD	NA	31.25	1.34	245.08	3.80	26.58	3.49
SM-S-12LB (0-5)	15.76	6.73	< LOD	NA	50.29	4.02	378.72	2.52	28.22	11.12
SM-S-12LB (5-25)	18.52	8.93	< LOD	NA	49.58	10.64	559.18	4.12	37.95	2.12
SM-S-12LB (25-50)	21.38	11.06	< LOD	NA	45.39	8.34	500.70	2.71	34.72	5.56
SM-S-12RB (0-5)	10.95	8.77	< LOD	NA	41.48	5.85	361.41	6.94	31.65	10.24
SM-S-12RB (5-25)	7.42	10.87	< LOD	NA	25.77	2.61	172.88	19.34	27.88	10.67
SM-S-12RB (25-50)	8.02	11.88	< LOD	NA	35.88	9.54	344.37	2.51	35.92	9.89
SM-S-13A (0-5)	7.12	13.36	< LOD	NA	29.66	3.72	255.72	3.74	30.16	10.09
SM-S-13A (5-25)	5.83	10.65	< LOD	NA	29.84	5.17	253.35	12.06	23.46	5.52
SM-S-13A (25-50)	10.14	6.38	< LOD	NA	31.25	6.79	411.79	0.88	30.07	5.08
SM-S-13LB (0-5)	18.95	12.22	< LOD	NA	46.01	4.83	483.16	4.41	26.16	18.08
SM-S-13LB (5-25)	26.27	2.54	< LOD	NA	49.68	1.30	549.77	1.98	34.92	3.16
SM-S-13LB (25-50)	21.21	4.33	< LOD	NA	50.47	4.69	541.45	2.79	35.48	13.25
SM-S-13RB (0-5)	10.02	4.28	< LOD	NA	37.24	4.60	415.27	4.15	28.04	5.83
SM-S-13RB (25-50)	13.54	6.33	< LOD	NA	31.56	4.39	334.33	0.94	27.07	18.70



Instituto de Geología
Universidad Nacional Autónoma de México
Departamento de Geoquímica
Laboratorio de Geoquímica Ambiental



muestra	Pb		Sr		Zn		Fe	
	mg/Kg	% CV	mg/Kg	% CV	mg/Kg	% CV	%	% CV
SM S-9RB (0-5)	24.82	4.70	251.58	0.58	55.23	1.04	2.21	0.67
SM-S-9RB (5-25)	16.60	4.35	229.70	0.87	40.91	6.18	1.32	0.50
SM-S-9RB (25-50)	17.29	4.69	217.63	0.56	43.57	2.99	1.49	0.21
SM-S-10A (0-5)	20.17	11.58	297.92	1.08	38.59	6.15	1.41	0.52
SM-S-10A (5-25)	19.37	7.85	270.52	0.46	29.48	7.00	0.79	0.72
SM-S-10A (25-50)	16.93	15.33	162.61	1.22	18.64	9.17	1.81	0.17
SM-S-10LB (0-5)	27.50	2.70	307.85	0.74	62.32	1.71	1.90	0.29
SM-S-10LB (5-25)	29.12	6.02	328.09	0.59	65.22	2.98	2.06	0.47
SM-S-10LB (25-50)	22.64	3.73	232.77	0.27	41.39	5.69	1.49	0.16
SM-S-10RB (0-5)	20.69	4.93	114.71	0.73	43.48	8.42	1.00	0.55
SM-S-10RB (5-25)	21.12	15.09	109.74	0.27	42.57	1.24	1.30	0.34
SM-S-10RB (25-50)	21.71	9.47	116.14	1.30	50.05	4.38	1.70	0.48
SM-S-11A (0-5)	17.51	7.73	212.82	0.67	30.88	2.22	1.06	0.18
SM-S-11A (5-25)	20.84	7.32	280.23	1.25	29.42	6.70	1.01	0.44
SM-S-11A (25-50)	21.35	9.16	238.08	0.95	27.68	1.92	1.25	0.35
SM-S-11LB (0-5)	27.39	3.09	140.06	0.29	69.56	2.09	1.98	0.15
SM-S-11LB (5-25)	20.05	3.12	118.56	0.09	53.96	0.46	1.70	0.32
SM-S-11LB (25-50)	18.82	8.73	115.55	0.44	43.60	6.76	1.60	0.31
SM-S-11RB (0-5)	22.56	7.20	285.90	0.69	55.08	4.17	1.79	0.85
SM-S-11RB (5-25)	21.66	6.64	344.36	0.57	44.04	8.38	1.35	0.76
SM-S-11RB (25-50)	22.19	5.83	312.28	0.33	53.63	6.49	1.65	0.28
SM-S-12A (0-5)	17.53	3.89	293.01	0.53	25.36	6.94	0.94	0.45
SM S-12A (5-25)	18.91	5.08	153.32	0.99	36.13	7.18	0.60	0.72
SM-S-12A (25-50)	15.82	9.33	188.72	0.61	26.66	10.52	0.84	0.88
SM-S-12LB (0-5)	23.97	2.85	295.15	0.21	57.83	5.62	1.61	0.15
SM-S-12LB (5-25)	31.45	6.19	308.05	0.56	61.23	3.02	2.31	0.33
SM-S-12LB (25-50)	34.91	2.09	284.88	0.41	68.70	0.56	2.35	0.34
SM-S-12RB (0-5)	20.96	3.16	233.83	0.89	47.97	2.96	1.55	0.42
SM-S-12RB (5-25)	20.49	12.26	166.94	0.27	25.42	9.69	0.81	1.31
SM-S-12RB (25-50)	16.44	13.90	235.71	0.53	20.02	11.54	2.65	0.23
SM-S-13A (0-5)	14.30	3.37	220.26	0.55	25.13	7.00	0.76	0.49
SM-S-13A (5-25)	16.59	6.32	208.01	0.69	28.38	1.00	0.88	0.45
SM S-13A (25-50)	18.38	2.45	186.61	0.18	40.94	7.45	1.26	0.69
SM-S-13LB (0-5)	32.73	1.75	296.42	1.12	81.00	2.38	2.07	0.58
SM-S-13LB (5-25)	36.85	4.48	351.05	0.45	83.70	3.58	2.27	0.28
SM-S-13LB (25-50)	38.33	3.80	331.83	0.42	88.34	0.79	2.13	0.42
SM-S-13RB (0-5)	18.55	1.65	143.50	0.29	37.94	6.02	2.07	0.33
SM-S-13RB (25-50)	18.61	6.62	92.83	1.08	27.15	6.00	2.20	0.57



Instituto de Geología
Universidad Nacional Autónoma de México
Departamento de Geoquímica
Laboratorio de Geoquímica Ambiental



muestra	As		Cd		Cu		Mn		Ni	
	mg/Kg	% CV	mg/Kg	% CV	mg/Kg	% CV	mg/Kg	% CV	mg/Kg	% CV
SM-S-14A (0-5)	9.84	11.50	< LOD	NA	36.24	6.93	415.85	3.97	32.20	9.95
SM S-14A (5-25)	7.64	9.03	< LOD	NA	38.66	13.02	346.39	5.52	33.09	4.00
SM-S-14A (25-50)	10.58	10.81	< LOD	NA	33.71	6.40	347.53	0.82	25.40	3.90
SM-S-14LB (0-5)	15.98	8.80	< LOD	NA	51.96	3.60	534.78	4.43	22.33	5.10
SM-S-14LB (5-25)	21.52	9.57	< LOD	NA	60.19	6.18	578.14	0.54	35.01	10.74
SM-S-14RB (0-5)	7.30	9.60	< LOD	NA	33.50	1.01	339.47	5.57	28.66	11.15
SM-S-14RB (5-25)	17.81	12.82	< LOD	NA	42.85	9.48	481.85	2.24	37.50	11.71
SM-S-14RB (25-50)	16.23	3.48	< LOD	NA	47.34	8.06	411.34	1.85	35.50	14.35
SM-S-15A (0-5)	<LOD	NA	< LOD	NA	27.29	7.01	164.39	10.98	19.66	9.69
SM S-15A (5-25)	4.58	20.87	< LOD	NA	27.03	10.32	249.03	5.22	22.60	15.54
SM S-15A (25-50)	5.39	6.03	< LOD	NA	32.69	4.15	229.82	0.93	23.36	10.14
SM-S-15LB (0-5)	12.93	6.32	< LOD	NA	44.75	4.45	605.48	0.45	33.47	5.16
SM-S-15LB (5-25)	13.35	9.00	< LOD	NA	49.09	3.07	622.56	1.70	37.61	5.47
SM-S-15LB (25-40)	13.06	11.37	< LOD	NA	43.97	6.29	555.88	0.89	31.32	3.50
SM-S-15RB (0-5)	7.16	15.31	< LOD	NA	52.31	6.87	400.74	0.90	24.58	5.76
SM-S-15RB (5-25)	6.60	18.75	< LOD	NA	39.40	12.37	422.72	2.22	34.77	13.25
SM-S-15RB (25-50)	5.30	12.01	< LOD	NA	42.21	2.55	380.16	2.28	24.87	3.59
SM-S-16A (0-5)	8.64	12.86	< LOD	NA	33.18	4.40	292.17	1.13	29.48	11.40
SM-S-16LB (0-5)	10.27	13.09	< LOD	NA	39.18	13.54	420.52	5.21	32.63	12.40
SM S 16LB (5-25)	10.91	5.39	< LOD	NA	37.46	7.72	420.57	5.89	32.54	15.39
SM-S-16LB (25-50)	9.74	0.44	< LOD	NA	45.70	9.88	380.91	2.39	27.05	15.90
SM-S-16RB (0-5)	8.15	12.84	< LOD	NA	39.82	11.37	331.09	6.15	30.72	8.07
SM-S-16RB (5-25)	8.57	3.44	< LOD	NA	32.78	5.98	281.09	3.84	32.09	12.69
SM-S-16RB (25-50)	6.06	11.09	< LOD	NA	29.41	9.46	237.53	2.61	33.31	4.33
SM-S-17A (0-5)	13.05	9.03	< LOD	NA	38.82	10.31	488.36	2.93	41.00	17.32
SM-S-17LB (0-5)	13.23	9.08	< LOD	NA	42.57	4.00	487.93	2.12	23.76	12.71
SM-S-17LB (5-25)	14.80	9.33	< LOD	NA	43.23	9.91	407.11	1.23	36.74	14.84
SM-S-17LB (25-50)	18.91	5.47	< LOD	NA	37.96	10.47	471.74	1.19	31.22	23.32
SM-S-17RB (0-5)	13.55	6.03	< LOD	NA	44.29	13.54	513.55	2.23	25.48	3.11
SM-S-17RB (5-25)	6.51	9.24	< LOD	NA	38.38	0.87	541.26	1.16	21.86	13.72
SM-S-17RB (25-50)	11.34	3.27	< LOD	NA	42.01	3.29	489.33	1.24	24.15	5.53
SM-S-18A (0-5)	6.76	9.79	< LOD	NA	32.30	10.81	257.28	1.46	26.46	3.41
SM-S-18LB (0-5)	15.81	1.57	< LOD	NA	45.51	5.55	435.63	8.61	34.08	3.45
SM-S-18LB (5-25)	14.23	4.51	< LOD	NA	42.83	7.37	374.42	2.18	36.87	10.24
SM-S-18LB (25-50)	16.03	10.14	< LOD	NA	47.51	4.76	372.76	3.78	32.82	12.93



Instituto de Geología
Universidad Nacional Autónoma de México
Departamento de Geoquímica
Laboratorio de Geoquímica Ambiental



muestra	Pb		Sr		Zn		Fe	
	mg/Kg	% CV	mg/Kg	% CV	mg/Kg	% CV	%	% CV
SM-S-14A (0-5)	20.26	9.88	154.71	0.42	37.75	3.28	1.61	0.45
SM S-14A (5-25)	17.53	6.28	198.53	0.94	39.41	1.20	1.42	0.20
SM-S-14A (25-50)	20.38	4.71	136.28	1.14	40.95	4.25	1.57	0.37
SM-S-14LB (0-5)	34.05	5.34	273.53	0.46	81.76	0.83	1.85	0.52
SM-S-14LB (5-25)	40.03	7.72	283.72	0.11	86.63	3.14	2.14	0.25
SM-S-14RB (0-5)	17.61	2.77	119.62	1.35	37.18	2.60	1.03	0.48
SM-S-14RB (5-25)	30.07	3.98	254.04	0.98	61.39	3.66	2.06	0.38
SM-S-14RB (25-50)	28.06	8.61	323.56	1.04	62.98	3.18	1.84	0.31
SM-S-15A (0-5)	22.33	5.59	127.87	1.30	27.06	3.68	0.35	1.22
SM S-15A (5-25)	15.38	7.80	89.71	0.92	29.48	5.51	0.85	0.76
SM S-15A (25-50)	15.31	10.39	98.85	1.02	31.50	6.98	1.14	0.38
SM-S-15LB (0-5)	30.60	3.41	294.31	0.49	72.80	1.77	1.87	0.12
SM-S-15LB (5-25)	31.46	2.50	308.45	0.81	75.29	6.10	1.91	0.37
SM-S-15LB (25-40)	27.17	6.44	303.27	0.77	71.06	4.88	1.78	0.87
SM-S-15RB (0-5)	28.56	2.35	425.73	0.58	68.12	4.47	1.97	0.48
SM-S-15RB (5-25)	43.01	1.66	408.54	0.97	59.06	7.48	1.52	0.24
SM-S-15RB (25-50)	43.71	4.08	403.81	0.46	55.77	2.03	1.49	0.72
SM-S-16A (0-5)	20.18	3.25	249.14	0.95	36.68	8.11	1.81	0.26
SM-S-16LB (0-5)	28.50	6.08	249.09	0.34	53.10	2.65	1.59	0.48
SM S 16LB (5-25)	24.86	0.70	247.08	1.60	57.05	3.51	1.52	1.57
SM-S-16LB (25-50)	24.23	13.63	250.87	0.87	50.02	5.65	1.40	5.33
SM-S-16RB (0-5)	22.34	15.32	202.40	0.96	49.24	2.51	1.71	0.24
SM-S-16RB (5-25)	21.22	3.43	214.45	0.66	36.84	0.69	1.33	0.47
SM-S-16RB (25-50)	40.59	3.50	201.72	0.68	55.11	7.76	1.27	0.29
SM-S-17A (0-5)	23.74	1.54	265.28	1.01	38.22	3.14	3.10	0.42
SM-S-17LB (0-5)	26.82	5.55	300.31	0.24	67.26	0.77	1.85	0.24
SM-S-17LB (5-25)	26.60	3.16	337.12	0.18	56.40	4.29	1.80	0.18
SM-S-17LB (25-50)	27.33	5.86	332.14	0.47	62.90	5.84	2.00	0.01
SM-S-17RB (0-5)	29.81	5.41	385.64	0.25	67.53	3.76	2.12	0.20
SM-S-17RB (5-25)	29.36	6.64	431.70	0.33	61.29	0.19	2.08	0.06
SM-S-17RB (25-50)	25.90	4.44	362.38	0.66	60.40	5.77	1.98	0.11
SM-S-18A (0-5)	18.10	1.98	176.33	0.68	32.82	3.24	0.83	0.45
SM-S-18LB (0-5)	32.99	1.29	333.04	0.69	74.73	2.13	1.77	0.75
SM-S-18LB (5-25)	26.62	4.59	334.11	0.71	57.74	3.50	1.73	0.26
SM-S-18LB (25-50)	28.95	3.91	331.40	1.16	63.52	5.45	2.28	0.98



Instituto de Geología
Universidad Nacional Autónoma de México
Departamento de Geoquímica
Laboratorio de Geoquímica Ambiental



muestra	As		Cd		Cu		Mn		Ni	
	mg/Kg	% CV	mg/Kg	% CV	mg/Kg	% CV	mg/Kg	% CV	mg/Kg	% CV
SM-S-18RB (0-5)	15.24	2.89	< LOD	NA	38.33	13.52	438.43	5.78	30.58	6.98
SM S-18RB (5-25)	13.22	7.01	< LOD	NA	48.05	13.04	392.25	4.57	30.27	4.64
SM-S-18RB (25-50)	14.46	3.18	< LOD	NA	41.16	6.22	369.28	3.73	31.68	8.89
SM-S-19A (0-5)	<LOD	NA	< LOD	NA	30.90	5.41	208.66	6.34	24.43	13.07
SM-S-19A (5-25)	5.48	10.16	< LOD	NA	28.29	11.36	456.73	6.72	45.13	18.98
SM S-19A (25-50)	4.53	7.48	< LOD	NA	29.48	10.70	364.86	2.68	28.09	6.18
SM-S-19LB (0-5)	9.79	9.43	< LOD	NA	47.99	1.76	444.07	4.26	28.77	5.65
SM S-19LB (5-25)	7.41	8.19	< LOD	NA	46.01	9.41	418.01	4.40	30.70	15.46
SM S-19LB (25-50)	7.91	7.78	< LOD	NA	39.39	0.05	413.31	3.15	34.04	4.31
SM S-19RB (0-5)	8.60	11.05	< LOD	NA	44.21	3.05	488.00	3.37	31.67	8.19
SM S-19RB (5-25)	10.85	7.27	< LOD	NA	45.24	7.86	593.41	1.31	25.58	6.90
SM S-19RB (25-50)	12.69	7.76	< LOD	NA	53.14	4.73	617.78	1.88	33.49	9.55
SM-S-20A (0-5)	3.12	4.31	< LOD	NA	21.04	6.03	197.29	2.94	23.78	7.48
SM-S-20A (5-25)	3.78	6.93	< LOD	NA	29.58	12.31	176.71	1.16	24.58	15.55
SM-S-20A (25-50)	4.41	13.47	< LOD	NA	27.67	4.27	166.35	9.61	22.60	9.12
SM-S-20LB (0-5)	8.02	3.70	< LOD	NA	39.56	11.39	282.21	3.28	26.53	13.57
SM-S-20LB (5-25)	7.63	13.35	< LOD	NA	36.29	3.25	332.82	4.67	33.42	3.46
SM-S-20LB (25-50)	6.33	11.62	< LOD	NA	33.84	6.41	255.40	7.72	32.25	9.47
SM-S-20RB (0-5)	8.13	3.47	< LOD	NA	42.40	4.34	434.40	3.32	36.61	14.19
SM-S-20RB (5-25)	3.98	14.21	< LOD	NA	34.93	6.46	231.77	2.00	27.89	5.16
SM-S-20RB (25-50)	9.40	7.30	< LOD	NA	35.82	1.87	273.75	0.38	27.45	8.78

muestra	Pb		Sr		Zn		Fe	
	mg/Kg	% CV	mg/Kg	% CV	mg/Kg	% CV	%	% CV
SM-S-18RB (0-5)	30.25	1.22	284.30	0.36	74.42	4.39	1.80	0.45
SM S-18RB (5-25)	27.82	7.60	306.92	0.58	53.69	3.64	1.82	0.24
SM-S-18RB (25-50)	26.62	4.15	295.84	0.44	51.58	8.21	1.76	0.51
SM-S-19A (0-5)	17.58	5.18	160.55	0.54	15.86	7.29	0.91	0.26
SM-S-19A (5-25)	15.07	3.16	189.87	1.12	11.69	12.45	4.88	0.22
SM S-19A (25-50)	15.57	6.46	174.40	0.73	35.34	5.65	1.31	0.63
SM-S-19LB (0-5)	21.88	3.12	312.56	1.04	60.22	1.86	1.84	0.34
SM S-19LB (5-25)	19.45	4.96	322.97	0.84	45.69	2.59	1.72	0.10
SM S-19LB (25-50)	20.82	3.24	302.00	0.97	46.03	2.51	1.63	0.36
SM S-19RB (0-5)	24.42	7.80	364.35	0.86	56.48	4.97	1.93	0.43
SM S-19RB (5-25)	26.22	4.95	364.76	0.18	71.38	1.87	2.28	0.78
SM S-19RB (25-50)	28.41	6.89	356.33	0.50	76.12	1.05	2.41	0.90
SM-S-20A (0-5)	14.03	5.68	178.54	0.67	17.07	12.28	0.67	0.71
SM-S-20A (5-25)	17.62	8.05	228.16	1.11	19.35	1.86	0.67	0.55
SM-S-20A (25-50)	15.78	13.03	219.42	0.84	21.98	7.92	0.74	0.37



muestra	Pb		Sr		Zn		Fe	
	mg/Kg	% CV	mg/Kg	% CV	mg/Kg	% CV	%	% CV
SM-S-20LB (0-5)	21.01	5.19	316.36	0.64	38.81	12.17	1.34	0.15
SM-S-20LB (5-25)	18.63	13.33	299.93	0.55	32.62	2.18	1.33	0.45
SM-S-20LB (25-50)	17.21	5.74	295.06	0.60	30.09	10.05	0.97	0.31
SM-S 20RB (0-5)	22.08	7.28	264.61	0.47	53.93	1.87	1.65	0.55
SM-S-20RB (5-25)	17.70	3.95	243.74	0.56	26.44	7.63	0.78	0.70
SM-S-20RB (25-50)	17.63	7.10	275.33	0.65	30.82	7.71	1.46	0.50

CONTROL DE CALIDAD

Precisión

Para la precisión de los análisis de FRX las mediciones se determinaron por triplicado, el valor reportado es el promedio de las tres determinaciones reportando también el % del coeficiente de variación (CV) de las mediciones (menor al 15%).

Exactitud

Para determinar la exactitud en FRX se utilizaron estándares certificados (TILL-4, Sandy soil y NIST-2710a) como control analítico los cuales fueron analizados como muestra para determinar su concentración las concentraciones se encontraron entre el 81 y el 109% lo cual indica un buen desempeño del método de análisis.

ESTANDAR	As	Cd	Cu	Fe	Mn	Ni	Pb	Sr	Zn
	% exactitud								
MONTANA 2710a	NA	NA	106.5	108.1	103.5	NA	99.3	87.4	109.3
TILL 4	97.0	NA	95.2	106.7	81.2	NA	101.2	100.4	NA
SANDY SOIL	NA	98.3	95.0	NA	NA	105.0	109.0	NA	95.0

Sin mas por al momento quedo a sus ordenes.

Analistas:

QFB. Fabiola Vega García

QA Daniel Ramos Perez

M en C Alicia Santana Silva

Responsable técnico: Luis Gerardo Martinez Jardinez

APÉNDICE DE LABORATORIO 1

Informe de Laboratorio del muestreo Realizado en Julio de 2015

(B) Análisis por Espectrometría de Emisión Óptica con Plasma Inductivamente Acoplado, Método B.4 NOM-147-SEMARNAT/SSA1-2004

- 224 muestras de suelo y sedimento en nueve transectos largos en el arroyo Tinajas
- 228 muestra de suelo y sedimento en ocho transectos largos en el Río Bacanuchi
- 224 muestras de suelo y sedimento en nueve transectos largos en el Río Sonora
- 129 muestras de suelo y sedimento en catorce transectos en los arroyos tributarios a la Presa el Molinito
- 90 muestras de suelo y sedimento para determinar valores de fondo en la cuenca del río Sonora

Informe de Laboratorio del muestreo Realizado en Febrero de 2015

313 muestras de suelos y sedimentos en 12 transectos cortos en arroyo Tinajas, río Bacanuchi, río Sonora y arroyo San Francisco



INFORME DE RESULTADOS ICP-OES
TINAJAS

Datos del solicitante:

Dr. Francisco Martín Romero correo electrónico: fmrch@geologia.unam.mx, fmrch@hotmail.com

Dirección: Instituto de Geología, UNAM. Teléfono: 56224386 ext 129

Información de las muestras:

Fecha de recepción de muestras: 13 de julio del 2015

Se analizaron 224 muestras de suelos
 Las muestras se recibieron en bolsas de plástico de 25X10 cm.

Información de los análisis

En las 129 muestras se determinaron elementos traza por Espectrometría de Emisión Óptica con Plasma Inductivamente Acoplado (ICP-OES) en un equipo Pekín Elmer serie 8300.

Las muestras fueron digeridas por el método EPA 3051, los resultados se reportan en mg/kg.

Modo de inyección : Cámara ciclónica.

Límites de detección :

Los límites considerados son para modo de inyección cámara ciclónica y están reportados en mg/l.

LD mg/L	Al	As	Ba	Cd	Cr	Cu	Fe	Mn	Ni	Pb	Sb	Zn
	0.08	0.07	0.01	0.02	0.003	0.122	0.01	0.007	0.01	0.03	0.1	0.007

Lista de muestras

ID Campo	coordenadas		ID Campo	coordenadas		ID Campo	coordenadas	
	X	Y		X	Y		X	Y
T1.1-A (0-5cm)	563545	3417793	T1.1-LB (30-60cm)	563550	3417795	T1.1-RB (50-100cm)	563549	3417793
T1.1-A (5-30cm)	563545	3417793	T1.1-LB (60-90cm)	563550	3417795	T1.1-RB (>100cm)	563549	3417793
T1.1-A (30-40cm)	563545	3417793	T1.1-LB (90-120cm)	563550	3417795	T2-A (0-5cm)	564012	3414465
T1.1-A (40-100cm)	563545	3417793	T1.1-LB (+120cm)	563550	3417795	T2-A (25cm)	564012	3414465
T1.1-A (>100cm)	563545	3417793	T1.1-RB (0-5cm)	563549	3417793	T2-A (50cm)	564012	3414465
T1.1-LB (0-5cm)	563550	3417795	T1.1-RB (5-25cm)	563549	3417793	T2-A (100cm)	564012	3414465
T1.1-LB (5-30cm)	563550	3417795	T1.1-RB (25-50cm)	563549	3417793	T2-A (150cm)	564012	3414465



Laboratorio Nacional de Geoquímica y Minerología
Universidad Nacional Autónoma de México
Geoquímica Ambiental



ID Campo	coordenadas		ID Campo	coordenadas		ID Campo	coordenadas	
	X	Y		X	Y		X	Y
T2-A (200cm)	564012	3414465	T3-LC (50cm)	563730	3412871	T4-LB (50cm)	563680	3411529
T2-A (240cm)	564012	3414465	T3-LC (100cm)	563730	3412871	T4-LB (50-100cm)	563680	3411529
T2-LB (0-5cm)	564004	3414471	T3-LD (0-5cm)	563724	3412857	T4-LB (100-150cm)	563680	3411529
T2-LB (25cm)	564004	3414471	T3-LD (25cm)	563724	3412857	T4-LB (150-200cm)	563680	3411529
T2-LB (50cm)	564004	3414471	T3-LD (50cm)	563724	3412857	T4-LB (200-300cm)	563680	3411529
T2-LB (100cm)	564004	3414471	T3-LD (100cm)	563724	3412857	T4-LB (340cm)	563680	3411529
T2-LB (150cm)	564004	3414471	T3-LE (0-5cm)	563717	3412844	T4-RB (0-5cm)	563689	3411506
T2-LB (200cm)	564004	3414471	T3-LE (25cm)	563717	3412844	T4-RB (10-30cm)	563689	3411506
T2-LB (240cm)	564004	3414471	T3-LE (50cm)	563717	3412844	T4-RB (50cm)	563689	3411506
T2-RB (0-5cm)	564023	3414463	T3-LE (100cm)	563717	3412844	T4-RB (100cm)	563689	3411506
T2-RB (25cm)	564023	3414463	T3-RB (5cm)	563745	3412881	T4-RB (150cm)	563689	3411506
T2-RB (50cm)	564023	3414463	T3-RB (25cm)	563745	3412881	T4-RB (200cm)	563689	3411506
T2-RB (100cm)	564023	3414463	T3-RB (50cm)	563745	3412881	T4-RB (250-270)	563689	3411506
T2-RB (150cm)	564023	3414463	T3-RB (100cm)	563745	3412881	T5-A (0-5cm)	563769	3409395
T2-RB (200cm)	564023	3414463	T3-RB (150cm)	563745	3412881	T5-A (25cm)	563769	3409395
T2-RB (230cm)	564023	3414463	T3-RC (0-5cm)	563752	3412895	T5-A (50cm)	563769	3409395
T3-A (0-5cm)	563743	3412880	T3-RC (25cm)	563752	3412895	T5-A (100cm)	563769	3409395
T3-A (25cm)	563743	3412880	T3-RC (50cm)	563752	3412895	T5-A (150cm)	563769	3409395
T3-A (50cm)	563743	3412880	T3-RC (100cm)	563752	3412895	T5-A (200cm)	563769	3409395
T3-A (100cm)	563743	3412880	T3-RD (5cm)	563771	3412909	T5-A (250cm)	563769	3409395
T3-A (150cm)	563743	3412880	T3-RD (25cm)	563771	3412909	T5-LB (0-5cm)	563766	3409395
T3-A (200cm)	563743	3412880	T3-RD (50cm)	563771	3412909	T5-LB (25cm)	563766	3409395
T3-A (250cm)	563743	3412880	T3-RD (100cm)	563771	3412909	T5-LB (50cm)	563766	3409395
T3-LB (0-5cm)	563741	3412879	T4-A (0-5cm)	563688	3411506	T5-LB (100cm)	563766	3409395
T3-LB (25cm)	563741	3412879	T4-A (25cm)	563688	3411506	T5-LB (150cm)	563766	3409395
T3-LB (50cm)	563741	3412879	T4-A (50cm)	563688	3411506	T5-LB (200cm)	563766	3409395
T3-LB (100cm)	563741	3412879	T4-A (100cm)	563688	3411506	T5-LC (0-5cm)	563762	3409395
T3-LB (150cm)	563741	3412879	T4-A (150cm)	563688	3411506	T5-LC (25cm)	563762	3409395
T3-LB (200cm)	563741	3412879	T4-A (200cm)	563688	3411506	T5-LC (50cm)	563762	3409395
T3-LB (250cm)	563741	3412879	T4-A (250cm)	563688	3411506	T5-LD (0-5cm)	563746	3409395
T3-LC (0-5cm)	563730	3412871	T4-LB (0-5cm)	563680	3411529	T5-LD (25cm)	563746	3409395
T3-LC (25cm)	563730	3412871	T4-LB (25cm)	563680	3411529	T5-LD (50cm)	563746	3409395



Laboratorio Nacional de Geoquímica y Minerología
Universidad Nacional Autónoma de México
Geoquímica Ambiental



ID Campo	coordenadas		ID Campo	coordenadas		ID Campo	coordenadas	
	X	Y		X	Y		X	Y
T5-LE (0-5cm)	563722	3409385	T6-RB (5cm)	563820	3408479	T7-RC (0-5cm)	563504	3407337
T5-LE (25cm)	563722	3409385	T6-RB (25cm)	563820	3408479	T7-RC (25cm)	563504	3407337
T5-LE (50cm)	563722	3409385	T6-RB (50cm)	563820	3408479	T7-RC (50cm)	563504	3407337
T5-RB (0-5cm)	563774	3409394	T6-RB (100cm)	563820	3408479	T7-RD (0-5cm)	563522	3407339
T5-RB (25cm)	563774	3409394	T6-RB (150cm)	563820	3408479	T7-RD (25cm)	563522	3407339
T5-RB (50cm)	563774	3409394	T6-RB (200cm)	563820	3408479	T7-RD (50cm)	563522	3407339
T5-RB (100cm)	563774	3409394	T7-A (0-5cm)	563492	3407362	T7-RE (0-5cm)	563548	3407349
T5-RB (150cm)	563774	3409394	T7-A (25cm)	563492	3407362	T7-RE (25cm)	563548	3407349
T5-RB (200cm)	563774	3409394	T7-A (50cm)	563492	3407362	T7-RE (50cm)	563548	3407349
T5-RC (0-5cm)	563775	3409394	T7-A (100cm)	563492	3407362	T8-A(0-5cm)	563683	3405740
T5-RC (25cm)	563775	3409394	T7-A(150cm)	563492	3407362	T8-A(25cm)	563683	3405740
T5-RC (50cm)	563775	3409394	T7-A (200cm)	563492	3407362	T8-A(50cm)	563683	3405740
T5-RD (0-5cm)	563790	3409411	T7-A (250cm)	563492	3407362	T8-A(100-120cm)	563683	3405740
T5-RD (25cm)	563790	3409411	T7-LB (0-5cm)	563489	3407362	T8-LB(0-5cm)	563679	3405740
T5-RD (50cm)	563790	3409411	T7-LB (25cm)	563489	3407362	T8-LB(25cm)	563679	3405740
T5-RE (0-5cm)	563820	3409421	T7-LB (50cm)	563489	3407362	T8-LB(50cm)	563679	3405740
T5-RE (25cm)	563820	3409421	T7-LB (100cm)	563489	3407362	T8-LB(80cm)	563679	3405740
T5-RE (50cm)	563820	3409421	T7-LB (150cm)	563489	3407362	T8-LC(0-5cm)	563684	3405760
T6-A (0-5cm)	563818	3408470	T7-LB (200cm)	563489	3407362	T8-LC(90cm)	563684	3405760
T6-A (25cm)	563818	3408470	T7-LC (0-5cm)	563475	3407359	T8-RB(0-5cm)	563691	3405738
T6-A (50cm)	563818	3408470	T7-LC (25cm)	563475	3407359	T8-RB(25cm)	563691	3405738
T6-A (100cm)	563818	3408470	T7-LC (50cm)	563475	3407359	T8-RB(50cm)	563691	3405738
T6-A (150cm)	563818	3408470	T7-LD (0-5cm)	563467	3407356	T8-RB(100cm)	563691	3405738
T6-A (200cm)	563818	3408470	T7-LD (25cm)	563467	3407356	T9-A (0-5cm)	563829	3403176
T6-LB (0-5cm)	563812	3408470	T7-LD (50cm)	563467	3407356	T9-A (5-25cm)	563829	3403176
T6-LB (25cm)	563812	3408470	T7-RB (0-5cm)	563500	3407360	T9-A (25-50cm)	563829	3403176
T6-LB (50cm)	563812	3408470	T7-RB (25cm)	563500	3407360	T9-A (50-100cm)	563829	3403176
T6-LB (100cm)	563812	3408470	T7-RB (50cm)	563500	3407360	T9-A (100-150cm)	563829	3403176
T6-LB (150cm)	563812	3408470	T7-RB (100cm)	563500	3407360	T9-A (150-170cm)	563829	3403176
T6-LB (200cm)	563812	3408470	T7-RB (150cm)	563500	3407360	T9-A (170-200cm)	563829	3403176
T6-LB (250cm)	563812	3408470	T7-RB (200cm)	563500	3407360	T9-A (+200cm)	563829	3403176



**Laboratorio Nacional de Geoquímica y Minerología
Universidad Nacional Autónoma de México
Geoquímica Ambiental**



ID Campo	coordenadas		ID Campo	coordenadas		ID Campo	coordenadas	
	X	Y		X	Y		X	Y
T5-LE (0-5cm)	563722	3409385	T6-RB (100cm)	563820	3408479	T7-RE (0-5cm)	563548	3407349
T5-LE (25cm)	563722	3409385	T6-RB (150cm)	563820	3408479	T7-RE (25cm)	563548	3407349
T5-LE (50cm)	563722	3409385	T6-RB (200cm)	563820	3408479	T7-RE (50cm)	563548	3407349
T5-RB (0-5cm)	563774	3409394	T7-A (0-5cm)	563492	3407362	T8-A(0-5cm)	563683	3405740
T5-RB (25cm)	563774	3409394	T7-A (25cm)	563492	3407362	T8-A(25cm)	563683	3405740
T5-RB (50cm)	563774	3409394	T7-A (50cm)	563492	3407362	T8-A(50cm)	563683	3405740
T5-RB (100cm)	563774	3409394	T7-A (100cm)	563492	3407362	T8-A(100-120cm)	563683	3405740
T5-RB (150cm)	563774	3409394	T7-A(150cm)	563492	3407362	T8-LB(0-5cm)	563679	3405740
T5-RB (200cm)	563774	3409394	T7-A (200cm)	563492	3407362	T8-LB(25cm)	563679	3405740
T5-RC (0-5cm)	563775	3409394	T7-A (250cm)	563492	3407362	T8-LB(50cm)	563679	3405740
T5-RC (25cm)	563775	3409394	T7-LB (0-5cm)	563489	3407362	T8-LB(80cm)	563679	3405740
T5-RC (50cm)	563775	3409394	T7-LB (25cm)	563489	3407362	T8-LC(0-5cm)	563684	3405760
T5-RD (0-5cm)	563790	3409411	T7-LB (50cm)	563489	3407362	T8-LC(90cm)	563684	3405760
T5-RD (25cm)	563790	3409411	T7-LB (100cm)	563489	3407362	T8-RB(0-5cm)	563691	3405738
T5-RD (50cm)	563790	3409411	T7-LB (150cm)	563489	3407362	T8-RB(25cm)	563691	3405738
T5-RE (0-5cm)	563820	3409421	T7-LB (200cm)	563489	3407362	T8-RB(50cm)	563691	3405738
T5-RE (25cm)	563820	3409421	T7-LC (0-5cm)	563475	3407359	T8-RB(100cm)	563691	3405738
T5-RE (50cm)	563820	3409421	T7-LC (25cm)	563475	3407359	T9-A (0-5cm)	563829	3403176
T6-A (0-5cm)	563818	3408470	T7-LC (50cm)	563475	3407359	T9-A (5-25cm)	563829	3403176
T6-A (25cm)	563818	3408470	T7-LD (0-5cm)	563467	3407356	T9-A (25-50cm)	563829	3403176
T6-A (50cm)	563818	3408470	T7-LD (25cm)	563467	3407356	T9-A (50-100cm)	563829	3403176
T6-A (100cm)	563818	3408470	T7-LD (50cm)	563467	3407356	T9-A (100-150cm)	563829	3403176
T6-A (150cm)	563818	3408470	T7-RB (0-5cm)	563500	3407360	T9-A (150-170cm)	563829	3403176
T6-A (200cm)	563818	3408470	T7-RB (25cm)	563500	3407360	T9-A (170-200cm)	563829	3403176
T6-LB (0-5cm)	563812	3408470	T7-RB (50cm)	563500	3407360	T9-A (+200cm)	563829	3403176
T6-LB (25cm)	563812	3408470	T7-RB (100cm)	563500	3407360	T9-LB (0-5cm)	563819	3403163
T6-LB (50cm)	563812	3408470	T7-RB (150cm)	563500	3407360	T9-LB (5-25cm)	563819	3403163
T6-LB (100cm)	563812	3408470	T7-RB (200cm)	563500	3407360	T9-LB (+200cm)	563819	3403163
T6-LB (150cm)	563812	3408470	T7-RC (0-5cm)	563504	3407337	T9-LB (25-50cm)	563819	3403163
T6-LB (200cm)	563812	3408470	T7-RC (25cm)	563504	3407337	T9-LB (50-100cm)	563819	3403163
T6-LB (250cm)	563812	3408470	T7-RC (50cm)	563504	3407337	T9-LB (100-150cm)	563819	3403163
T6-RB (5cm)	563820	3408479	T7-RD (0-5cm)	563522	3407339	T9-LB (150-200cm)	563819	3403163
T6-RB (25cm)	563820	3408479	T7-RD (25cm)	563522	3407339			
T6-RB (50cm)	563820	3408479	T7-RD (50cm)	563522	3407339			



Laboratorio Nacional de Geoquímica y Minerología
Universidad Nacional Autónoma de México
Geoquímica Ambiental



ID Campo	Al		As		Ba		Cd		Cr		Cu	
	mg/kg	RSD %	mg/kg	RSD %	mg/kg	RSD %	mg/kg	RSD %	mg/kg	RSD %	mg/kg	RSD %
T1.1-A (0-5cm)	24522.98	1.21	42.46	6.27	147.40	0.70	5.28	0.68	35.46	1.89	186.31	0.91
T1.1-A (5-30cm)	19190.13	2.13	40.59	4.48	131.20	0.98	5.39	1.73	29.84	2.25	171.09	1.48
T1.1-A (30-40cm)	23731.66	0.28	52.61	3.16	170.17	0.66	5.83	5.40	45.22	2.82	170.90	2.13
T1.1-A (40-100cm)	26031.94	1.66	42.57	4.17	218.23	1.26	5.59	0.35	45.26	2.51	168.77	2.69
T1.1-A (>100cm)	27299.28	1.38	49.36	2.67	210.19	1.33	6.18	0.54	51.62	1.17	223.30	0.29
T1.1-LB (0-5cm)	20401.28	2.32	25.20	3.81	116.07	2.45	4.94	2.79	44.86	4.53	405.01	2.46
T1.1-LB (5-30cm)	22368.18	2.00	22.94	8.76	130.59	2.07	5.18	5.30	43.51	2.05	442.90	1.16
T1.1-LB (30-60cm)	21385.13	1.18	23.80	1.25	137.75	1.32	5.45	0.73	41.50	0.96	659.14	0.74
T1.1-LB (60-90cm)	25135.70	1.32	12.15	6.73	166.40	1.27	6.21	1.24	52.13	2.02	111.77	1.90
T1.1-LB (90-120cm)	29284.43	2.84	12.40	5.23	170.51	2.95	6.09	1.52	50.93	1.73	118.68	1.62
T1.1-LB (+120cm)	28037.71	2.17	13.57	3.75	170.71	2.28	6.18	2.07	47.29	3.78	153.65	4.15
T1.1-RB (0-5cm)	20900.94	3.80	36.85	1.75	158.39	3.83	5.51	5.28	40.25	2.89	259.21	2.68
T1.1-RB (5-25cm)	25501.85	3.18	25.02	7.12	130.91	3.39	5.63	3.10	44.95	1.84	302.00	1.44
T1.1-RB (25-50cm)	24794.51	0.73	33.05	3.59	129.96	0.75	5.25	3.07	41.94	1.75	302.00	1.24
T1.1-RB (50-100cm)	23233.33	2.53	29.69	5.08	132.80	2.59	5.17	2.25	39.85	4.92	298.83	0.54
T1.1-RB (>100cm)	21362.47	2.45	25.56	4.27	140.81	2.58	4.63	3.90	38.94	2.80	222.60	2.83
T2-A (0-5cm)	25026.21	2.53	28.47	2.82	122.89	2.08	5.41	1.61	44.52	0.85	168.02	0.13
T2-A (25cm)	20047.13	1.55	24.25	1.29	117.73	1.61	4.69	2.35	32.32	0.98	150.20	1.25
T2-A (50cm)	20887.08	1.76	20.74	4.29	103.49	1.84	3.96	1.54	24.60	2.82	133.38	1.40
T2-A (100cm)	20638.01	2.57	39.88	2.69	181.10	2.57	5.49	2.91	34.08	0.85	155.87	0.94
T2-A (150cm)	22629.25	1.66	21.66	5.40	166.90	1.81	5.92	2.72	37.87	1.82	187.50	2.44
T2-A (200cm)	25407.38	1.88	20.18	1.54	180.82	1.97	7.35	4.24	39.10	3.06	198.48	3.05
T2-A (240cm)	27789.61	1.39	23.32	2.70	205.73	1.45	7.63	1.32	40.96	0.66	212.70	0.25
T2-LB (0-5cm)	22412.35	2.90	19.15	1.24	148.35	3.03	4.79	2.36	29.59	1.19	227.72	0.64
T2-LB (25cm)	20594.79	4.44	25.32	4.24	142.29	4.78	4.58	3.94	30.72	1.95	228.67	1.92
T2-LB (50cm)	19693.65	2.62	27.57	2.20	137.99	2.74	4.74	1.27	33.54	2.58	215.36	2.09
T2-LB (100cm)	15187.68	3.99	23.14	4.10	147.85	4.20	5.02	1.24	31.09	1.56	209.95	1.48
T2-LB (150cm)	24493.47	4.63	22.41	5.75	487.94	4.90	6.87	4.57	37.65	4.35	267.45	4.27
T2-LB (200cm)	26284.79	0.50	21.41	5.13	204.66	0.54	6.59	2.15	42.29	1.65	215.08	1.78
T2-LB (240cm)	23829.84	1.51	26.17	6.72	225.57	1.64	6.40	1.76	40.12	2.22	230.82	1.49
T2-RB (0-5cm)	18664.71	4.34	12.64	3.67	99.95	4.43	4.58	4.29	20.35	4.07	141.17	3.75
T2-RB (25cm)	17859.15	3.47	18.73	4.48	107.35	3.66	4.66	3.08	22.49	2.24	108.20	2.45
T2-RB (50cm)	15957.22	4.37	20.19	7.32	132.18	4.61	4.88	2.62	24.31	2.41	159.97	2.31
T2-RB (100cm)	22068.47	4.13	26.63	9.07	227.04	4.26	5.78	3.87	39.93	1.71	313.62	1.52



Laboratorio Nacional de Geoquímica y Minerología
Universidad Nacional Autónoma de México
Geoquímica Ambiental



ID Campo	Fe		Mn		Ni		Pb		Sb		Zn	
	mg/kg	RSD %	mg/kg	RSD %	mg/kg	RSD %	mg/kg	RSD %	mg/kg	RSD %	mg/kg	RSD %
T1.1-A (0-5cm)	34651.06	1.79	1223.50	1.69	22.93	0.51	141.62	1.13	<LOD	NA	263.08	3.17
T1.1-A (5-30cm)	34582.19	2.55	1259.32	2.51	18.28	0.67	183.17	1.92	<LOD	NA	240.79	1.91
T1.1-A (30-40cm)	43922.19	0.62	781.05	0.57	24.80	1.83	188.32	1.90	<LOD	NA	235.26	2.87
T1.1-A (40-100cm)	43168.83	1.75	652.14	3.43	24.10	2.09	183.27	2.61	<LOD	NA	243.61	2.42
T1.1-A (>100cm)	44811.10	1.86	1773.90	1.78	27.62	1.41	197.81	2.08	<LOD	NA	283.83	1.21
T1.1-LB (0-5cm)	33645.78	2.90	1387.39	1.94	25.55	1.00	132.65	0.61	<LOD	NA	232.14	4.20
T1.1-LB (5-30cm)	34005.40	2.55	1491.03	1.56	26.13	0.67	123.24	0.14	<LOD	NA	235.63	2.68
T1.1-LB (30-60cm)	32975.86	1.58	1537.49	0.87	29.35	1.45	127.98	1.80	<LOD	NA	235.62	1.53
T1.1-LB (60-90cm)	37961.16	1.37	1851.28	2.32	34.25	1.11	127.05	1.14	<LOD	NA	293.12	1.94
T1.1-LB (90-120cm)	36388.46	3.24	1721.83	2.05	35.52	2.35	116.66	2.55	<LOD	NA	288.97	1.74
T1.1-LB (+120cm)	35282.31	2.54	1861.19	0.37	34.08	5.30	114.91	2.29	<LOD	NA	289.15	4.10
T1.1-RB (0-5cm)	36821.58	4.31	1024.48	2.72	25.79	0.93	176.13	1.43	<LOD	NA	255.12	2.83
T1.1-RB (5-25cm)	36312.62	3.76	1201.62	1.81	26.36	1.77	168.97	1.52	<LOD	NA	271.10	2.08
T1.1-RB (25-50cm)	34931.34	0.74	886.42	1.10	24.22	2.03	148.09	2.32	<LOD	NA	246.92	2.02
T1.1-RB (50-100cm)	34510.56	2.74	774.69	0.85	25.21	2.38	140.99	2.10	<LOD	NA	248.23	4.71
T1.1-RB (>100cm)	34105.55	2.93	661.94	2.70	24.31	0.79	136.87	0.48	<LOD	NA	210.32	2.62
T2-A (0-5cm)	35295.31	3.09	649.12	1.02	21.88	0.78	97.46	1.35	<LOD	NA	203.57	0.94
T2-A (25cm)	30692.97	2.16	909.39	0.52	19.42	1.38	107.44	1.36	<LOD	NA	217.51	1.04
T2-A (50cm)	26769.00	1.91	794.87	0.86	18.15	0.28	136.42	0.77	<LOD	NA	179.09	1.92
T2-A (100cm)	34171.99	2.84	1384.64	0.97	21.89	2.07	109.86	1.00	<LOD	NA	210.66	0.93
T2-A (150cm)	35195.06	2.05	2363.92	1.61	25.63	0.65	120.82	0.13	<LOD	NA	302.81	2.22
T2-A (200cm)	35251.54	2.38	2051.84	2.36	25.47	0.91	127.43	0.48	<LOD	NA	307.17	3.24
T2-A (240cm)	37993.10	1.58	2090.53	1.46	26.76	0.74	116.79	0.39	<LOD	NA	285.97	0.40
T2-LB (0-5cm)	27559.85	3.26	978.42	0.41	20.57	0.93	84.42	1.74	<LOD	NA	195.55	0.56
T2-LB (25cm)	31360.32	5.49	920.22	1.20	18.61	2.28	91.73	2.62	<LOD	NA	186.58	1.94
T2-LB (50cm)	32158.85	3.04	1566.03	1.02	20.69	3.09	169.29	3.03	<LOD	NA	202.96	2.46
T2-LB (100cm)	31204.15	4.75	1403.13	1.84	21.14	1.31	99.83	1.07	<LOD	NA	222.73	1.60
T2-LB (150cm)	31870.05	5.49	3815.24	0.41	31.58	0.95	160.80	1.84	<LOD	NA	299.84	4.21
T2-LB (200cm)	39454.61	0.55	2062.80	3.24	25.30	2.71	153.93	0.96	<LOD	NA	263.22	1.43
T2-LB (240cm)	36994.11	1.89	2540.47	1.70	26.36	1.67	192.31	2.08	<LOD	NA	284.54	1.94
T2-RB (0-5cm)	21094.18	4.92	687.17	1.43	15.76	1.68	54.54	1.39	<LOD	NA	198.65	3.43
T2-RB (25cm)	26332.13	4.19	682.32	1.81	15.53	1.18	71.37	0.87	<LOD	NA	190.00	2.30
T2-RB (50cm)	29588.07	5.14	1533.86	1.24	17.56	2.01	131.14	0.15	<LOD	NA	220.07	2.10
T2-RB (100cm)	36330.36	4.69	2332.09	1.09	27.68	2.84	144.51	2.86	<LOD	NA	249.22	1.68



Laboratorio Nacional de Geoquímica y Minerología
Universidad Nacional Autónoma de México
Geoquímica Ambiental



ID Campo	Al		As		Ba		Cd		Cr		Cu	
	mg/kg	RSD %	mg/kg	RSD %	mg/kg	RSD %	mg/kg	RSD %	mg/kg	RSD %	mg/kg	RSD %
T2-RB (150cm)	21640.91	4.45	24.87	4.98	156.36	4.61	5.60	3.18	35.11	1.09	216.69	1.83
T2-RB (200cm)	27117.04	2.94	18.74	8.93	185.35	3.03	5.72	3.17	37.69	1.52	276.98	1.37
T2-RB (230cm)	25382.15	1.63	17.25	3.56	160.00	1.70	5.64	4.31	38.16	2.95	215.19	3.27
T3-A (0-5cm)	20507.51	1.22	27.28	6.37	164.92	1.25	6.47	5.21	65.34	3.87	180.29	4.22
T3-A (25cm)	16977.57	0.81	24.02	10.32	129.37	0.85	4.51	1.27	26.61	1.26	142.43	0.41
T3-A (50cm)	16376.25	0.75	27.32	9.38	155.31	0.64	4.61	1.28	43.52	1.35	207.16	0.95
T3-A (100cm)	15880.79	1.31	23.42	7.29	149.99	1.35	4.54	2.03	30.62	1.39	249.10	1.65
T3-A (150cm)	20181.74	1.18	20.22	6.45	175.62	1.27	4.58	1.57	28.99	2.50	314.48	1.60
T3-A (200cm)	32645.48	1.44	20.66	6.39	216.50	1.58	5.74	5.66	43.50	1.37	434.28	1.95
T3-A (250cm)	33610.97	1.57	19.04	2.41	243.37	1.73	6.66	2.91	40.97	0.94	542.69	1.77
T3-LB (0-5cm)	16250.80	0.86	23.77	6.47	128.55	0.83	4.40	0.37	32.17	1.23	228.79	1.23
T3-LB (25cm)	18581.82	0.47	30.98	5.12	163.80	0.56	5.43	3.02	41.19	1.88	220.67	1.81
T3-LB (50cm)	19368.72	2.09	28.47	3.23	180.68	2.21	5.09	0.91	38.17	1.14	242.48	0.94
T3-LB (100cm)	23175.78	1.82	23.63	8.18	172.69	1.89	4.59	2.24	32.70	1.16	250.74	0.53
T3-LB (150cm)	17304.03	0.44	21.61	6.09	158.49	0.43	4.35	1.12	26.57	1.97	260.11	1.38
T3-LB (200cm)	35551.17	0.38	19.41	3.00	266.78	0.40	5.83	1.76	35.57	3.30	226.69	3.37
T3-LB (250cm)	41315.18	1.11	18.73	8.12	352.89	1.25	5.34	0.80	30.47	1.39	139.46	1.19
T3-LC (0-5cm)	19550.92	2.04	20.42	4.65	158.41	2.08	4.92	3.05	36.39	2.43	96.27	2.08
T3-LC (25cm)	20764.27	2.08	22.38	1.89	164.65	2.29	4.63	1.74	36.60	2.41	115.05	1.89
T3-LC (50cm)	25232.78	1.16	22.57	9.30	221.08	1.16	5.41	2.32	40.67	1.00	91.77	1.10
T3-LC (100cm)	17265.70	0.66	22.64	7.34	186.40	0.64	5.07	1.59	43.24	1.00	79.32	0.55
T3-LD (0-5cm)	20371.12	0.73	17.67	5.96	167.87	0.94	4.69	0.90	36.69	1.27	70.43	0.89
T3-LD (25cm)	20201.51	2.82	21.08	7.26	176.16	3.14	4.58	2.46	33.04	0.11	91.99	0.60
T3-LD (50cm)	16215.99	0.46	18.06	7.95	130.97	0.45	4.02	2.80	31.96	1.37	72.66	1.56
T3-LD (100cm)	19825.71	0.54	24.38	10.15	163.29	0.62	5.07	0.66	43.75	1.16	80.59	1.17
T3-LE (0-5cm)	22737.66	0.92	21.64	4.78	177.04	0.83	5.08	1.13	41.15	0.83	132.84	0.66
T3-LE (25cm)	21970.01	3.39	20.08	2.25	162.63	3.65	5.13	2.41	44.07	0.13	128.95	0.46
T3-LE (50cm)	21232.85	3.13	24.29	3.62	175.83	3.24	2.55	3.22	40.45	2.52	418.98	7.21
T3-LE (100cm)	14693.58	3.39	26.68	9.08	150.84	3.55	2.41	4.83	40.46	1.09	196.30	2.24
T3-RB (5cm)	13925.90	3.25	24.14	4.39	114.31	4.91	2.17	10.21	32.67	3.37	275.87	3.02
T3-RB (25cm)	14902.05	0.69	33.45	6.91	178.06	0.69	2.27	7.93	65.93	1.96	253.44	1.55



Laboratorio Nacional de Geoquímica y Minerología
Universidad Nacional Autónoma de México
Geoquímica Ambiental



ID Campo	Fe		Mn		Ni		Pb		Sb		Zn	
	mg/kg	RSD %	mg/kg	RSD %	mg/kg	RSD %	mg/kg	RSD %	mg/kg	RSD %	mg/kg	RSD %
T2-RB (150cm)	32554.69	5.15	1091.22	1.17	21.12	1.29	87.36	1.37	<LOD	NA	201.03	1.88
T2-RB (200cm)	32003.97	3.33	1455.37	0.94	25.35	0.53	89.18	0.53	<LOD	NA	240.76	1.91
T2-RB (230cm)	34415.98	1.70	1252.27	0.88	23.66	1.75	83.52	0.87	<LOD	NA	235.73	3.21
T3-A (0-5cm)	40935.31	0.53	1131.95	1.13	29.96	0.96	114.09	0.97	<LOD	NA	230.20	4.06
T3-A (25cm)	29164.50	0.89	1329.14	1.76	21.19	1.31	80.28	1.49	<LOD	NA	197.63	0.41
T3-A (50cm)	30361.67	1.03	1231.08	1.28	39.84	0.56	103.75	0.49	<LOD	NA	206.05	1.09
T3-A (100cm)	28121.14	1.52	1349.66	0.77	26.11	0.38	95.55	0.77	<LOD	NA	206.60	1.54
T3-A (150cm)	28467.54	0.65	1417.27	1.28	25.25	0.11	91.79	0.28	<LOD	NA	212.05	1.75
T3-A (200cm)	33195.96	0.76	1542.40	1.82	33.51	0.93	94.00	1.18	<LOD	NA	278.17	1.46
T3-A (250cm)	33782.07	0.24	1759.19	1.98	38.77	0.23	94.04	0.49	<LOD	NA	316.08	1.06
T3-LB (0-5cm)	28414.51	0.56	1022.92	0.89	38.54	0.79	86.51	0.83	<LOD	NA	214.63	1.22
T3-LB (25cm)	34614.66	0.70	1519.53	1.04	29.05	0.60	112.47	1.16	<LOD	NA	223.32	1.71
T3-LB (50cm)	32050.12	0.21	1491.20	1.41	27.06	1.44	114.81	1.52	<LOD	NA	223.04	1.18
T3-LB (100cm)	28826.05	1.24	1143.77	1.78	25.17	1.26	96.18	0.39	<LOD	NA	218.22	0.52
T3-LB (150cm)	26642.85	1.12	1219.16	0.30	23.88	0.80	75.19	0.94	<LOD	NA	203.74	1.68
T3-LB (200cm)	33536.14	0.83	1655.43	1.05	34.58	0.16	92.32	0.55	<LOD	NA	275.57	3.37
T3-LB (250cm)	32247.37	0.66	1438.27	2.10	32.99	1.07	81.89	1.90	<LOD	NA	241.54	1.11
T3-LC (0-5cm)	31568.44	0.54	1146.46	0.57	21.55	1.58	90.37	1.74	<LOD	NA	169.59	1.97
T3-LC (25cm)	29882.50	1.42	1172.77	0.90	22.88	0.88	88.40	0.46	<LOD	NA	178.30	1.88
T3-LC (50cm)	33534.16	0.49	1379.99	0.72	27.04	1.33	99.00	0.92	<LOD	NA	188.24	1.03
T3-LC (100cm)	31851.17	0.67	1537.49	1.14	32.75	0.83	105.64	1.61	<LOD	NA	195.56	0.94
T3-LD (0-5cm)	30564.74	1.45	1120.10	1.30	21.46	0.58	82.52	0.45	<LOD	NA	159.39	1.24
T3-LD (25cm)	29892.33	0.58	1105.81	0.91	23.05	1.57	86.06	1.92	<LOD	NA	172.59	0.31
T3-LD (50cm)	27256.48	1.87	979.63	1.37	18.92	0.71	83.16	0.22	<LOD	NA	154.16	1.88
T3-LD (100cm)	33418.91	0.38	1317.32	1.18	21.96	0.40	111.98	1.15	<LOD	NA	176.50	1.38
T3-LE (0-5cm)	31559.26	0.83	1251.53	1.10	24.24	1.62	89.16	0.56	<LOD	NA	185.01	0.74
T3-LE (25cm)	32135.25	1.03	1083.38	0.55	24.99	0.57	93.92	0.61	<LOD	NA	184.46	0.20
T3-LE (50cm)	32972.38	0.78	1257.50	1.56	25.08	2.11	109.92	1.27	<LOD	NA	196.53	2.44
T3-LE (100cm)	32337.99	0.83	1299.47	2.09	22.69	1.20	110.97	1.14	<LOD	NA	176.33	1.82
T3-RB (5cm)	31023.36	4.32	1035.76	1.88	24.21	3.32	98.51	3.07	<LOD	NA	207.48	2.69
T3-RB (25cm)	36662.53	0.95	1105.19	0.80	42.45	0.85	149.94	0.87	<LOD	NA	212.64	1.69



Laboratorio Nacional de Geoquímica y Minerología
Universidad Nacional Autónoma de México
Geoquímica Ambiental



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T3-RB (50cm)	20051.39	3.02	37.61	4.57	234.10	3.28	3.13	4.89	53.05	2.03	326.88	1.53
T3-RB (100cm)	20033.29	1.03	33.21	5.86	192.38	1.17	2.61	8.99	38.31	4.42	331.70	4.50
T3-RB (150cm)	22267.98	3.67	34.99	7.84	217.57	4.01	3.06	10.00	42.41	0.50	444.36	0.25
T3-RC (0-5cm)	27946.01	1.76	20.46	9.34	213.93	1.94	3.51	6.87	56.47	0.39	242.83	0.82
T3-RC (25cm)	25891.87	0.78	20.69	5.98	215.76	0.77	3.07	5.72	38.30	1.07	180.76	1.11
T3-RC (50cm)	22558.89	0.47	21.92	4.50	211.09	0.41	3.12	1.42	42.24	1.54	153.90	2.23
T3-RC (100cm)	17450.74	1.02	21.00	11.64	181.98	1.21	3.57	0.65	50.38	1.92	160.13	1.50
T3-RD (5cm)	26074.24	0.32	19.52	8.78	175.63	0.51	5.50	2.67	46.23	0.30	145.11	0.26
T3-RD (25cm)	33935.06	0.88	18.56	2.79	212.63	0.96	5.88	1.37	49.81	1.09	165.78	0.66
T3-RD (50cm)	29174.67	1.97	19.04	11.16	218.81	2.09	5.32	1.35	48.68	1.45	122.80	1.73
T3-RD (100cm)	31802.73	1.02	17.10	9.86	237.88	1.10	5.55	2.83	45.72	1.05	110.59	1.05
T4-A (0-5cm)	19170.51	3.94	17.66	3.97	139.97	4.14	3.90	2.55	21.13	1.48	106.65	0.99
T4-A (25cm)	14238.54	1.55	22.87	5.21	122.18	1.60	4.43	3.06	25.46	3.01	118.63	2.19
T4-A (50cm)	16026.88	3.59	29.41	5.94	152.32	3.88	4.56	3.36	26.14	4.99	116.98	4.07
T4-A (100cm)	17964.80	1.28	36.13	4.04	152.41	1.37	5.02	2.23	27.45	0.96	153.91	0.94
T4-A (150cm)	15777.91	0.94	27.86	2.99	137.21	1.00	4.66	4.64	25.30	3.34	142.22	2.83
T4-A (200cm)	18515.96	1.21	34.15	2.00	153.15	1.31	5.19	3.01	27.19	3.30	188.46	2.85
T4-A (250cm)	31276.29	3.66	17.82	5.24	208.37	3.88	4.53	3.19	27.72	2.78	86.29	2.42
T4-LB (0-5cm)	18643.42	0.28	18.10	3.12	141.59	0.34	3.82	1.72	16.98	2.69	92.36	0.96
T4-LB (25cm)	16987.48	2.29	21.11	2.63	142.33	2.40	4.24	2.77	25.25	2.15	98.25	0.81
T4-LB (50cm)	15570.93	1.88	31.97	3.06	181.21	2.03	4.56	1.77	24.84	3.98	127.91	3.03
T4-LB (50-100cm)	19247.10	1.59	27.04	5.90	169.46	1.63	4.56	1.72	24.82	1.09	148.74	1.23
T4-LB (100-150cm)	17460.85	2.41	19.57	7.58	160.69	2.63	3.98	2.12	18.20	1.58	175.67	0.62
T4-LB (150-200cm)	20819.85	1.69	18.99	2.29	189.77	1.75	5.43	3.67	24.67	4.32	90.98	3.15
T4-LB (200-300cm)	19492.79	1.34	20.39	1.98	179.37	1.35	4.63	3.44	23.96	3.14	65.38	2.79
T4-LB (340cm)	25092.48	0.66	16.88	1.83	180.12	0.71	4.48	0.72	24.95	1.72	67.27	1.25
T4-RB (0-5cm)	24021.21	2.10	20.20	2.45	208.79	2.27	5.14	1.96	30.77	1.47	140.10	1.11
T4-RB (10-30cm)	18256.36	2.34	35.38	2.32	184.81	2.54	5.21	4.12	31.02	2.28	173.37	1.69
T4-RB (50cm)	14986.41	4.46	17.90	1.96	125.97	4.58	4.00	0.67	20.67	1.31	76.18	1.07
T4-RB (100cm)	17954.45	3.02	21.53	2.36	251.27	3.23	4.72	2.47	31.61	2.58	59.39	2.17
T4-RB (150cm)	19461.62	1.58	18.96	2.13	167.96	1.73	4.89	3.93	29.45	2.99	64.93	2.27
T4-RB (200cm)	13569.58	1.94	18.74	4.32	149.93	1.95	3.99	1.11	23.71	1.38	66.54	0.90
T4-RB (250-270cm)	21325.89	2.58	19.71	0.92	164.04	2.77	5.58	0.66	37.45	1.37	74.40	2.05



Laboratorio Nacional de Geoquímica y Minerología
Universidad Nacional Autónoma de México
Geoquímica Ambiental



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	mg/kg	RSD %	mg/kg	RSD %	mg/kg	RSD %	mg/kg	RSD %	mg/kg	RSD %	mg/kg	RSD %
T3-RB (50cm)	42215.96	1.11	1987.54	1.08	30.43	2.37	155.82	1.58	<LOD	NA	266.73	1.44
T3-RB (100cm)	35314.04	0.57	1514.17	1.62	27.27	0.77	113.93	1.05	<LOD	NA	235.24	4.54
T3-RB (150cm)	36606.23	0.41	1731.57	0.67	31.33	1.68	137.94	0.82	<LOD	NA	275.33	0.46
T3-RC (0-5cm)	36395.89	1.49	1520.55	1.08	36.67	0.30	116.57	0.27	<LOD	NA	270.96	0.46
T3-RC (25cm)	32687.35	0.97	1332.63	1.91	31.60	1.31	100.11	1.37	<LOD	NA	226.64	0.78
T3-RC (50cm)	33634.62	0.28	1393.70	0.83	31.43	0.77	98.12	0.49	<LOD	NA	217.13	1.56
T3-RC (100cm)	34039.54	0.93	1503.04	0.70	33.83	0.70	124.55	0.33	<LOD	NA	218.53	1.60
T3-RD (5cm)	33511.22	1.01	1393.92	0.65	31.72	1.94	105.30	2.49	<LOD	NA	241.26	0.09
T3-RD (25cm)	34939.70	0.51	1505.62	2.52	35.55	0.42	114.24	0.51	<LOD	NA	279.28	0.50
T3-RD (50cm)	33983.50	1.28	1443.06	0.33	31.82	0.82	93.53	1.09	<LOD	NA	230.79	1.63
T3-RD (100cm)	35201.10	0.14	1676.28	1.17	34.72	0.58	114.31	0.59	<LOD	NA	252.52	0.82
T4-A (0-5cm)	24380.27	4.72	835.79	0.44	17.79	1.80	66.48	2.03	<LOD	NA	154.45	1.73
T4-A (25cm)	29431.16	1.68	708.22	1.08	17.86	0.36	86.98	0.93	<LOD	NA	146.11	2.16
T4-A (50cm)	31515.96	4.29	1195.11	1.81	15.41	1.70	85.72	1.03	<LOD	NA	150.17	4.17
T4-A (100cm)	32366.59	1.57	907.89	0.95	17.48	3.04	80.14	1.54	<LOD	NA	175.05	0.85
T4-A (150cm)	27662.31	1.13	932.59	1.71	18.42	0.38	70.26	0.42	<LOD	NA	170.05	2.82
T4-A (200cm)	32092.18	1.63	1029.04	1.61	18.45	1.84	74.99	2.54	<LOD	NA	185.36	2.96
T4-A (250cm)	28399.52	4.14	1205.60	2.10	21.94	0.86	71.11	0.89	<LOD	NA	195.49	2.33
T4-LB (0-5cm)	23182.44	0.57	719.79	1.36	16.28	0.43	54.09	0.92	<LOD	NA	146.69	1.23
T4-LB (25cm)	29472.94	2.73	942.79	1.38	15.91	1.40	65.34	0.86	<LOD	NA	150.98	1.27
T4-LB (50cm)	29452.13	2.35	1296.80	0.92	16.84	1.57	89.84	0.73	<LOD	NA	148.72	3.26
T4-LB (50-100cm)	28442.78	1.99	777.30	1.18	16.61	0.96	69.83	1.22	<LOD	NA	162.71	0.94
T4-LB (100-150cm)	24163.09	3.12	1025.20	2.62	15.08	1.21	51.97	2.27	<LOD	NA	153.04	0.46
T4-LB (150-200cm)	28653.79	2.16	1770.94	2.10	19.49	1.16	85.26	1.88	<LOD	NA	251.25	3.28
T4-LB (200-300cm)	29741.85	1.39	1379.29	0.82	18.49	0.29	85.19	0.66	<LOD	NA	170.20	3.17
T4-LB (340cm)	27219.38	0.89	1061.95	2.55	20.77	0.42	66.84	0.41	<LOD	NA	172.35	0.96
T4-RB (0-5cm)	30253.90	2.42	1138.87	0.92	25.20	2.79	80.14	2.28	<LOD	NA	199.43	1.33
T4-RB (10-30cm)	32491.95	2.88	1190.91	2.05	18.23	0.49	107.36	0.21	<LOD	NA	172.01	1.70
T4-RB (50cm)	23946.25	5.40	964.31	0.93	16.40	1.18	64.97	1.57	<LOD	NA	173.46	0.98
T4-RB (100cm)	29945.00	3.69	1590.49	0.53	19.24	1.44	100.87	1.54	<LOD	NA	173.28	2.19
T4-RB (150cm)	31368.70	2.03	1035.74	0.92	20.06	2.14	80.58	1.36	<LOD	NA	162.25	2.55
T4-RB (200cm)	26348.13	2.18	1223.05	0.71	18.39	1.22	79.52	0.92	<LOD	NA	150.80	0.59
T4-RB (250-270cm)	35973.41	3.15	1811.78	1.59	22.40	1.56	116.24	2.35	<LOD	NA	204.80	1.97



Laboratorio Nacional de Geoquímica y Minerología
Universidad Nacional Autónoma de México
Geoquímica Ambiental



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T5-A (0-5cm)	11860.58	0.95	14.86	10.56	118.96	1.01	2.75	3.55	75.09	0.52	92.27	0.71
T5-A (25cm)	14154.84	1.84	39.04	6.25	186.42	1.90	3.80	1.31	70.74	1.59	164.23	1.02
T5-A (50cm)	11507.71	1.45	24.52	5.36	147.46	1.45	3.08	0.93	59.20	1.64	151.55	1.49
T5-A (100cm)	13007.86	1.81	31.21	4.87	124.35	1.94	2.86	0.35	64.12	1.29	155.55	2.17
T5-A (150cm)	10344.82	1.14	18.29	5.74	99.99	1.24	2.52	2.64	48.60	1.36	144.44	1.52
T5-A (200cm)	17381.56	3.55	27.15	8.09	162.02	3.85	4.15	2.39	69.63	0.59	186.22	0.90
T5-A (250cm)	21786.00	0.82	17.95	8.54	172.77	0.95	3.78	2.98	55.35	0.44	224.48	0.07
T5-LB (0-5cm)	11698.35	0.76	22.97	6.36	151.32	0.87	3.30	1.10	58.86	0.53	106.10	0.23
T5-LB (25cm)	22717.09	0.41	27.83	2.08	230.10	0.42	4.19	1.85	63.87	2.11	237.97	1.89
T5-LB (50cm)	26470.88	1.18	27.66	5.73	244.11	1.11	3.97	1.02	73.71	3.07	281.22	3.64
T5-LB (100cm)	27769.08	1.90	70.91	3.18	254.40	2.01	4.66	4.50	49.75	2.01	305.55	2.01
T5-LB (150cm)	36847.00	0.46	16.11	4.23	272.11	0.47	7.02	1.39	50.69	1.27	643.64	0.40
T5-LB (200cm)	29840.13	1.92	18.85	2.94	246.54	1.98	6.75	0.57	45.64	1.45	641.73	2.68
T5-LC (0-5cm)	19741.94	1.44	16.80	9.14	178.61	1.44	4.22	3.48	47.32	0.61	116.60	1.21
T5-LC (25cm)	43032.84	2.87	17.86	1.27	291.11	3.01	5.00	1.59	51.40	1.86	127.05	2.33
T5-LC (50cm)	35926.43	2.96	12.58	1.45	250.71	3.14	4.82	2.03	45.17	1.82	110.60	2.24
T5-LD (0-5cm)	32751.67	0.63	15.24	0.61	233.87	0.61	4.29	2.99	48.71	0.30	83.09	0.72
T5-LD (25cm)	49651.41	1.47	14.80	1.86	314.18	1.51	5.11	3.73	51.18	1.07	118.50	1.15
T5-LD (50cm)	38524.32	1.09	12.76	1.82	267.59	1.18	4.82	1.20	45.04	1.33	104.72	1.70
T5-LE (0-5cm)	52318.20	0.59	16.89	0.30	343.47	0.59	5.79	4.48	52.93	2.56	132.02	2.99
T5-LE (25cm)	46820.60	2.04	15.65	1.07	335.04	2.19	5.92	1.86	49.78	2.95	139.71	2.73
T5-LE (50cm)	41286.28	0.38	18.10	1.33	297.10	0.31	5.51	0.24	51.30	3.90	122.01	4.43
T5-RB (0-5cm)	11763.84	0.88	33.57	2.56	164.27	0.98	4.17	2.27	76.73	2.09	110.76	2.71
T5-RB (25cm)	13622.72	0.83	27.30	2.95	186.33	0.90	4.23	0.48	106.27	2.08	109.73	2.40
T5-RB (50cm)	13918.91	1.34	33.42	3.90	184.05	1.42	4.42	1.33	69.01	3.01	120.72	3.70
T5-RB (100cm)	14209.95	0.25	22.96	2.09	171.41	0.31	4.70	1.30	72.46	1.79	147.78	1.87
T5-RB (150cm)	15314.64	0.03	20.79	2.08	195.94	0.05	4.25	1.96	87.73	4.30	66.07	5.97
T5-RB (200cm)	15654.77	0.34	17.76	3.01	145.06	0.45	3.36	1.83	65.13	1.26	82.51	1.79
T5-RC (0-5cm)	17311.32	2.62	17.37	1.79	181.66	2.62	3.72	1.05	63.73	2.96	66.12	3.95
T5-RC (25cm)	14229.38	1.15	20.54	4.30	203.70	1.05	4.22	1.82	62.56	1.40	69.63	1.93
T5-RC (50cm)	17252.10	0.41	18.66	1.26	204.81	0.37	4.32	3.26	90.68	2.30	59.33	3.21
T5-RD (0-5cm)	39734.23	1.01	13.14	2.96	277.79	1.07	5.29	3.12	49.07	1.57	109.09	2.26
T5-RD (25cm)	37518.16	2.10	13.56	1.40	286.40	2.24	5.28	0.39	44.40	1.53	108.05	2.20
T5-RD (50cm)	25605.48	1.10	14.18	2.30	193.74	1.12	4.60	1.44	64.78	2.77	72.69	3.42



Laboratorio Nacional de Geoquímica y Minerología
Universidad Nacional Autónoma de México
Geoquímica Ambiental



ID Campo	Fe		Mn		Ni		Pb		Sb		Zn	
	mg/kg	RSD %	mg/kg	RSD %	mg/kg	RSD %	mg/kg	RSD %	mg/kg	RSD %	mg/kg	RSD %
T5-A (0-5cm)	23663.83	1.18	674.32	1.56	18.67	0.91	49.54	0.56	<LOD	NA	141.15	1.01
T5-A (25cm)	32152.40	1.12	1142.84	1.32	20.03	2.32	93.96	0.99	<LOD	NA	182.61	1.80
T5-A (50cm)	26745.64	0.79	683.40	0.83	18.71	0.71	76.54	0.84	<LOD	NA	187.84	1.44
T5-A (100cm)	24252.27	0.38	746.42	0.58	17.59	1.84	69.67	1.12	<LOD	NA	165.40	1.45
T5-A (150cm)	20292.10	0.17	732.73	1.69	17.13	0.61	53.73	1.52	<LOD	NA	157.81	1.41
T5-A (200cm)	31813.54	0.90	1519.73	0.47	21.50	0.24	99.84	0.86	<LOD	NA	210.65	0.81
T5-A (250cm)	27167.76	0.64	1122.72	0.92	21.59	0.59	74.48	0.64	<LOD	NA	222.65	0.17
T5-LB (0-5cm)	27212.08	0.39	970.65	0.79	19.69	1.53	70.97	2.15	<LOD	NA	167.70	0.45
T5-LB (25cm)	31776.81	0.13	1001.70	2.11	24.81	1.05	76.31	0.96	<LOD	NA	193.31	2.05
T5-LB (50cm)	32056.19	1.06	836.05	1.05	23.24	1.89	76.54	1.42	<LOD	NA	200.56	3.28
T5-LB (100cm)	38909.01	0.61	634.35	1.14	24.18	0.88	91.55	0.75	<LOD	NA	213.70	1.61
T5-LB (150cm)	33997.13	0.77	1621.67	0.46	38.84	1.63	85.21	1.27	<LOD	NA	440.93	1.43
T5-LB (200cm)	31824.31	1.08	1609.50	2.83	37.98	0.37	82.16	0.81	<LOD	NA	430.01	1.78
T5-LC (0-5cm)	27845.62	1.51	1439.49	1.51	29.88	0.54	78.65	0.54	<LOD	NA	239.20	0.80
T5-LC (25cm)	34821.56	0.53	1635.06	1.48	37.26	1.00	95.17	0.71	<LOD	NA	289.15	2.44
T5-LC (50cm)	34476.02	0.22	1480.32	1.04	33.99	0.90	88.32	1.18	<LOD	NA	283.62	1.97
T5-LD (0-5cm)	33070.68	0.39	1354.80	0.51	31.65	1.07	92.40	0.63	<LOD	NA	222.83	0.85
T5-LD (25cm)	36887.82	0.72	1656.64	1.39	38.93	1.11	92.50	0.11	<LOD	NA	309.26	1.03
T5-LD (50cm)	33293.39	0.95	1652.88	0.11	37.03	0.86	93.24	0.98	<LOD	NA	277.88	1.13
T5-LE (0-5cm)	38867.76	1.13	1808.65	1.46	43.44	0.39	100.08	1.15	<LOD	NA	314.96	2.64
T5-LE (25cm)	38636.06	0.70	1876.12	1.29	43.50	1.37	106.99	2.17	<LOD	NA	332.39	2.39
T5-LE (50cm)	37629.86	0.66	1796.46	1.44	44.42	1.07	103.69	1.56	<LOD	NA	304.36	3.57
T5-RB (0-5cm)	32678.20	0.71	950.00	0.99	21.61	0.36	94.95	0.40	<LOD	NA	174.76	1.83
T5-RB (25cm)	31971.31	0.27	1346.19	1.57	22.91	1.61	104.98	1.19	<LOD	NA	174.84	2.12
T5-RB (50cm)	31992.73	0.78	1581.26	0.80	21.54	1.26	105.90	0.16	<LOD	NA	200.19	3.42
T5-RB (100cm)	27631.47	1.41	1427.24	1.35	24.29	1.61	84.80	0.32	<LOD	NA	232.95	1.85
T5-RB (150cm)	31389.21	1.26	1764.94	1.26	23.56	1.11	101.40	1.02	<LOD	NA	186.05	4.19
T5-RB (200cm)	24685.20	0.80	1098.48	1.77	20.82	0.94	71.84	0.52	<LOD	NA	179.70	1.36
T5-RC (0-5cm)	27607.57	0.48	1182.57	0.78	24.44	2.08	88.87	1.81	<LOD	NA	167.35	3.10
T5-RC (25cm)	31296.12	0.52	1503.17	1.33	25.76	0.81	111.15	1.28	<LOD	NA	176.98	1.56
T5-RC (50cm)	32006.61	1.02	1395.77	1.07	25.10	1.57	86.97	3.30	<LOD	NA	187.14	2.22
T5-RD (0-5cm)	35347.24	0.45	1669.43	1.76	37.02	1.24	92.76	0.67	<LOD	NA	278.34	1.75
T5-RD (25cm)	34754.51	1.46	1683.50	1.02	38.43	0.82	95.49	0.34	<LOD	NA	285.53	1.82
T5-RD (50cm)	32976.93	0.83	1398.39	1.45	31.53	0.80	93.49	1.87	<LOD	NA	219.64	2.85



Laboratorio Nacional de Geoquímica y Minerología
Universidad Nacional Autónoma de México
Geoquímica Ambiental



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T5-RE (0-5cm)	53095.93	1.62	19.93	1.31	351.57	1.69	5.78	1.84	44.09	2.65	118.36	2.66
T5-RE (25cm)	42049.28	1.32	13.98	2.68	303.56	1.47	5.54	1.31	52.64	2.64	107.91	3.52
T5-RE (50cm)	30487.04	0.29	13.68	0.67	233.88	0.34	4.89	2.68	47.90	1.31	89.22	2.18
T6-A (0-5cm)	11454.79	2.04	31.45	1.92	252.90	2.12	7.18	0.67	54.47	1.73	279.83	2.57
T6-A (25cm)	19015.19	1.19	40.82	2.38	313.76	1.28	6.48	1.92	45.69	0.23	317.61	1.32
T6-A (50cm)	19732.94	0.67	36.03	1.04	213.44	0.82	5.74	2.38	42.45	1.11	332.70	0.94
T6-A (100cm)	44052.86	0.92	18.30	2.20	334.84	0.99	10.03	1.04	40.68	0.59	1099.35	1.43
T6-A (150cm)	41768.28	1.75	17.74	0.90	304.79	1.79	6.09	2.20	51.94	1.97	219.31	0.66
T6-A (200cm)	28903.40	0.57	17.09	1.98	276.31	0.53	5.32	0.90	41.78	4.08	148.24	3.40
T6-LB (0-5cm)	15551.08	0.52	16.36	0.61	212.63	0.63	6.16	1.98	41.12	0.68	176.77	0.28
T6-LB (25cm)	15943.95	1.83	18.44	2.63	179.60	2.09	5.44	0.61	34.05	1.79	138.42	1.43
T6-LB (50cm)	15657.58	1.33	16.92	1.10	164.93	1.41	4.74	2.63	31.77	0.63	71.00	0.82
T6-LB (100cm)	22729.71	1.40	14.25	4.23	228.25	1.53	5.23	1.10	30.83	2.62	87.00	2.15
T6-LB (150cm)	12454.29	0.66	15.01	0.58	215.34	0.64	4.89	4.23	29.83	1.77	65.17	2.33
T6-LB (200cm)	15774.47	1.17	16.32	0.60	182.36	1.20	4.74	0.58	25.58	3.01	80.22	2.42
T6-LB (250cm)	39682.67	3.67	20.29	2.72	288.33	3.91	6.75	0.60	37.72	2.62	119.71	2.52
T6-RB (5cm)	16967.24	2.22	24.83	8.81	194.26	2.43	5.24	2.72	45.33	2.10	162.47	1.59
T6-RB (25cm)	16849.43	3.43	41.48	3.32	198.64	3.62	5.07	1.37	38.42	1.79	189.72	1.00
T6-RB (50cm)	15589.59	2.47	37.16	3.77	169.82	2.56	4.29	2.34	31.10	2.98	159.85	2.88
T6-RB (100cm)	38669.82	1.70	27.00	8.99	295.16	1.88	5.65	1.30	42.46	2.33	451.79	1.87
T6-RB (150cm)	37453.16	0.15	18.87	0.22	266.88	0.22	5.08	0.54	37.30	1.64	126.28	0.89
T6-RB (200cm)	33544.26	1.22	19.76	1.34	283.82	1.34	4.80	0.93	31.43	1.06	118.17	0.63
T7-A (0-5cm)	23026.42	0.61	31.23	0.70	313.78	0.70	5.50	4.83	34.10	3.48	187.08	3.60
T7-A (25cm)	21036.81	0.76	44.82	0.74	354.50	0.74	5.80	0.19	27.88	1.63	183.23	1.42
T7-A (50cm)	15043.56	1.32	23.38	1.47	142.18	1.47	4.95	3.04	31.60	3.05	167.31	2.28
T7-A (100cm)	18731.69	1.68	22.87	1.85	188.97	1.85	5.10	2.23	37.41	0.59	344.13	1.66
T7-A (150cm)	24660.38	3.04	29.42	3.28	365.37	3.28	5.97	1.01	30.14	0.45	688.17	0.34
T7-A (200cm)	31715.07	1.84	19.62	1.99	360.06	1.99	5.85	3.95	34.27	1.91	1297.35	2.17
T7-A (250cm)	54926.78	1.05	22.26	1.14	427.10	1.14	7.39	2.85	43.96	1.06	730.19	2.80
T7-LB (0-5cm)	16655.20	2.22	17.48	2.26	134.58	2.26	4.90	2.19	39.04	0.45	281.75	0.61
T7-LB (25cm)	45511.97	1.42	28.39	1.53	419.30	1.53	6.38	6.63	39.65	2.39	237.20	2.37
T7-LB (50cm)	46868.65	1.87	31.60	1.92	380.28	1.92	6.13	2.66	36.07	2.24	185.73	1.92
T7-LB (100cm)	32505.67	2.94	28.32	9.56	382.07	3.16	5.49	3.83	36.28	2.07	118.87	1.91
T7-LB (150cm)	24585.51	3.23	25.92	0.94	348.71	3.48	4.44	3.30	26.11	3.36	85.41	2.33
T7-LB (200cm)	54787.97	3.19	21.49	1.38	381.73	3.30	6.49	1.49	38.62	0.11	157.42	0.30



Laboratorio Nacional de Geoquímica y Minerología
Universidad Nacional Autónoma de México
Geoquímica Ambiental



ID Campo	Fe		Mn		Ni		Pb		Sb		Zn	
	mg/kg	RSD %	mg/kg	RSD %	mg/kg	RSD %	mg/kg	RSD %	mg/kg	RSD %	mg/kg	RSD %
T5-RE (0-5cm)	37793.13	0.41	1865.04	1.34	40.45	1.21	98.33	1.38	<LOD	NA	309.94	2.13
T5-RE (25cm)	36415.26	1.31	1692.89	1.03	37.27	1.10	95.95	0.71	<LOD	NA	287.42	2.94
T5-RE (50cm)	34041.15	0.16	1530.70	1.46	33.72	1.14	93.79	1.45	<LOD	NA	246.47	1.45
T6-A (0-5cm)	41713.93	1.53	1455.33	1.94	26.36	0.23	125.92	0.50	<LOD	NA	221.61	1.49
T6-A (25cm)	38379.65	1.29	1379.84	1.54	26.16	1.07	118.44	1.34	<LOD	NA	211.41	0.17
T6-A (50cm)	35233.11	1.04	1006.07	0.85	28.02	0.33	99.11	0.79	<LOD	NA	205.77	1.06
T6-A (100cm)	36478.85	1.34	2099.89	1.26	41.88	1.44	95.38	1.53	<LOD	NA	625.30	0.96
T6-A (150cm)	35588.65	1.68	1627.54	2.21	46.01	1.79	99.15	1.99	<LOD	NA	288.31	1.62
T6-A (200cm)	31762.98	0.58	1370.97	1.42	34.85	1.26	84.74	1.04	<LOD	NA	223.35	3.87
T6-LB (0-5cm)	33827.67	0.35	1142.39	0.84	24.38	1.63	86.77	1.57	<LOD	NA	162.11	0.54
T6-LB (25cm)	30175.97	1.32	1169.61	0.33	24.05	1.21	83.62	0.73	<LOD	NA	160.97	1.52
T6-LB (50cm)	27709.90	2.36	1120.09	2.73	20.10	2.69	75.96	2.56	<LOD	NA	146.65	0.94
T6-LB (100cm)	28838.43	1.47	1110.36	0.82	23.97	2.09	70.30	2.70	<LOD	NA	155.86	1.89
T6-LB (150cm)	27846.69	0.46	1117.76	0.88	21.37	0.56	80.39	0.49	<LOD	NA	135.13	2.47
T6-LB (200cm)	26442.64	0.78	1137.24	0.18	21.27	0.74	85.19	1.31	<LOD	NA	157.43	2.49
T6-LB (250cm)	33858.62	0.52	1447.60	0.87	32.98	1.01	89.17	1.19	<LOD	NA	245.80	2.84
T6-RB (5cm)	35804.79	1.06	1015.27	2.04	24.05	0.79	93.75	0.48	<LOD	NA	190.48	1.76
T6-RB (25cm)	36350.36	0.98	1029.59	2.30	22.56	1.51	95.30	0.95	<LOD	NA	185.40	1.27
T6-RB (50cm)	30984.70	1.02	824.97	0.99	20.15	2.64	87.94	1.33	<LOD	NA	168.48	2.81
T6-RB (100cm)	39178.91	0.62	1510.45	1.81	34.31	2.44	96.69	2.53	<LOD	NA	309.01	2.14
T6-RB (150cm)	33460.42	0.21	1448.40	1.51	33.66	1.03	85.82	0.65	<LOD	NA	260.01	1.10
T6-RB (200cm)	32119.38	1.11	1476.60	1.87	32.92	1.31	90.22	0.76	<LOD	NA	241.19	0.59
T7-A (0-5cm)	33911.57	0.35	1352.64	1.67	26.96	0.82	103.63	0.12	<LOD	NA	199.60	3.31
T7-A (25cm)	35055.57	1.56	1341.60	1.78	26.74	1.59	123.16	1.67	<LOD	NA	213.13	1.68
T7-A (50cm)	29901.06	0.43	929.54	1.42	21.84	1.17	77.75	0.72	<LOD	NA	164.64	2.25
T7-A (100cm)	29867.93	1.37	966.77	1.87	23.69	0.92	76.55	1.50	<LOD	NA	194.99	0.43
T7-A (150cm)	32037.71	0.56	1243.05	0.23	31.09	1.82	78.76	1.73	<LOD	NA	243.54	0.49
T7-A (200cm)	31478.66	0.35	1710.83	2.24	33.30	1.36	87.54	1.00	<LOD	NA	260.34	1.82
T7-A (250cm)	36817.19	0.30	2169.99	3.43	47.66	1.07	109.04	1.13	<LOD	NA	375.02	1.00
T7-LB (0-5cm)	29773.55	1.42	805.51	0.79	24.14	0.68	62.40	0.54	<LOD	NA	172.68	0.24
T7-LB (25cm)	36766.34	0.58	1805.11	0.56	37.78	0.21	112.51	1.15	<LOD	NA	302.62	2.17
T7-LB (50cm)	35231.73	0.74	1500.36	1.26	35.90	1.24	99.16	2.43	<LOD	NA	280.00	1.87
T7-LB (100cm)	33694.54	1.00	1316.05	1.15	33.29	1.19	84.16	1.71	<LOD	NA	214.21	1.68
T7-LB (150cm)	29137.09	0.34	985.32	0.69	26.43	0.73	66.44	1.50	<LOD	NA	169.89	2.12
T7-LB (200cm)	36607.20	1.09	1831.07	0.94	36.37	1.02	110.53	1.33	<LOD	NA	311.54	0.27



Laboratorio Nacional de Geoquímica y Minerología
Universidad Nacional Autónoma de México
Geoquímica Ambiental



ID Campo	Al		As		Ba		Cd		Cr		Cu	
	mg/kg	RSD %	mg/kg	RSD %	mg/kg	RSD %	mg/kg	RSD %	mg/kg	RSD %	mg/kg	RSD %
T7-LC (0-5cm)	16286.00	2.26	16.11	1.87	195.26	2.50	4.46	5.47	39.87	1.06	109.16	1.13
T7-LC (25cm)	21058.94	2.21	21.21	2.17	190.38	2.40	5.88	3.41	44.75	2.82	115.99	4.25
T7-LC (50cm)	21221.93	2.53	17.78	0.96	230.29	2.70	4.91	3.49	34.85	1.88	117.02	2.28
T7-LD (0-5cm)	21332.50	1.96	17.53	1.82	210.79	2.03	5.87	3.17	54.93	0.73	109.16	0.83
T7-LD (25cm)	26556.23	2.02	19.22	0.58	244.17	2.20	5.95	3.87	44.07	2.22	149.72	1.81
T7-LD (50cm)	17958.06	1.86	15.79	1.03	175.76	1.91	5.90	3.77	64.92	1.00	87.92	0.74
T7-RB (0-5cm)	16162.97	1.36	46.49	0.19	490.32	1.50	6.31	1.50	34.61	1.41	162.83	1.23
T7-RB (25cm)	17584.42	2.20	50.38	4.47	365.08	2.39	5.98	2.64	27.05	1.81	163.83	1.65
T7-RB (50cm)	21595.97	0.98	49.89	2.21	529.84	1.04	7.43	2.37	41.25	3.34	170.64	2.94
T7-RB (100cm)	40823.81	1.25	27.65	6.20	460.56	1.34	6.13	0.92	39.44	1.38	309.99	1.01
T7-RB (150cm)	35354.75	3.33	28.75	9.31	423.46	3.52	5.67	1.37	35.04	2.84	142.56	2.52
T7-RB (200cm)	39600.46	0.31	19.01	3.51	540.77	0.40	5.87	2.91	32.99	3.79	134.57	3.24
T7-RC (0-5cm)	26236.36	1.25	30.73	3.20	355.49	1.33	5.55	3.70	36.53	1.28	92.74	0.95
T7-RC (25cm)	37128.59	1.67	15.61	6.64	320.47	1.76	5.67	2.75	50.58	1.51	92.01	1.26
T7-RC (50cm)	38677.27	0.39	16.89	6.38	353.88	0.44	5.68	5.57	38.48	3.20	94.52	2.71
T7-RD (0-5cm)	26506.97	2.22	27.92	4.19	359.14	2.43	5.30	2.66	35.94	2.09	111.65	1.76
T7-RD (25cm)	32438.04	0.65	27.89	2.43	421.82	0.72	5.63	1.59	32.21	1.85	119.62	2.16
T7-RD (50cm)	24078.23	0.95	29.64	3.07	389.96	1.03	5.14	5.94	33.21	3.69	85.25	3.97
T7-RE (0-5cm)	28286.15	1.32	30.05	4.00	337.48	1.48	5.53	2.33	32.71	1.43	171.95	0.50
T7-RE (25cm)	20931.25	1.06	29.43	4.21	358.90	1.17	5.15	1.08	31.25	1.08	83.14	1.61
T7-RE (50cm)	27477.05	1.21	32.42	9.06	435.47	1.32	4.81	3.71	26.56	1.20	111.68	1.20
T8-A(0-5cm)	23863.27	1.99	25.89	3.35	235.72	2.05	7.16	7.62	29.52	4.43	210.74	2.58
T8-A(25cm)	12786.67	2.70	31.83	7.32	129.68	2.77	5.17	2.23	14.86	0.76	237.88	1.43
T8-A(50cm)	16917.54	0.50	27.58	6.77	173.08	0.56	5.58	3.98	19.55	3.22	236.72	2.74
T8-A(100-120cm)	16125.46	1.44	29.46	3.42	174.52	1.55	5.24	2.14	22.65	2.82	277.31	1.82
T8-LB(0-5cm)	16683.40	0.71	36.60	5.09	236.60	0.73	5.99	1.16	32.31	1.95	201.97	2.33
T8-LB(25cm)	15869.76	3.18	29.58	4.60	161.02	3.35	4.97	3.07	20.57	0.44	212.65	0.86
T8-LB(50cm)	26248.73	0.69	28.39	1.90	269.66	0.84	4.93	3.09	23.23	2.68	140.07	2.51
T8-LB(80cm)	23979.95	1.92	18.84	3.58	208.35	2.04	4.70	4.42	37.26	1.82	51.65	1.59
T8-LC(0-5cm)	39151.86	1.20	29.23	2.05	343.47	1.19	6.12	5.57	30.59	4.26	673.20	0.91
T8-LC(90cm)	34146.38	1.72	15.51	4.07	334.74	1.81	4.72	6.04	27.57	3.09	62.46	2.19



Laboratorio Nacional de Geoquímica y Minerología
Universidad Nacional Autónoma de México
Geoquímica Ambiental



ID Campo	Fe		Mn		Ni		Pb		Sb		Zn	
	mg/kg	RSD %	mg/kg	RSD %	mg/kg	RSD %	mg/kg	RSD %	mg/kg	RSD %	mg/kg	RSD %
T7-LC (0-5cm)	27998.14	0.64	1134.26	1.38	25.35	1.63	76.35	2.00	<LOD	NA	155.09	1.09
T7-LC (25cm)	32234.72	0.55	1310.34	1.87	26.91	0.98	89.89	0.55	<LOD	NA	172.70	2.46
T7-LC (50cm)	29826.56	1.41	1303.80	2.17	26.77	0.55	78.75	0.44	<LOD	NA	168.57	2.24
T7-LD (0-5cm)	34439.85	0.41	1347.70	0.96	28.38	2.34	97.74	2.20	<LOD	NA	170.71	0.63
T7-LD (25cm)	35229.08	0.10	1294.40	1.82	29.84	0.50	79.77	0.80	<LOD	NA	204.12	2.11
T7-LD (50cm)	36011.13	0.53	1129.23	0.58	29.31	0.46	70.78	0.59	<LOD	NA	147.72	0.73
T7-RB (0-5cm)	38077.40	2.46	1729.18	1.03	29.45	1.04	159.99	1.16	<LOD	NA	232.16	1.17
T7-RB (25cm)	35712.86	0.24	1494.95	0.19	28.24	1.96	133.53	1.57	<LOD	NA	226.86	1.68
T7-RB (50cm)	43686.49	1.41	1787.17	1.30	31.33	0.16	172.02	0.41	<LOD	NA	248.54	3.03
T7-RB (100cm)	35247.16	2.02	1395.95	1.20	37.41	0.66	85.06	0.86	<LOD	NA	236.03	1.08
T7-RB (150cm)	34400.96	0.91	1278.51	2.23	33.08	0.62	79.23	0.33	<LOD	NA	225.34	2.69
T7-RB (200cm)	33603.09	1.11	1797.91	1.95	33.48	3.62	101.01	1.41	<LOD	NA	268.69	3.24
T7-RC (0-5cm)	34599.97	0.46	1322.28	1.00	27.55	1.18	100.54	0.49	<LOD	NA	182.01	0.94
T7-RC (25cm)	34325.33	0.88	1266.57	1.16	39.91	0.88	67.57	0.35	<LOD	NA	198.31	1.13
T7-RC (50cm)	34383.13	1.12	1229.37	0.75	38.15	1.76	70.38	1.10	<LOD	NA	199.21	3.13
T7-RD (0-5cm)	33384.08	2.07	1224.89	2.23	28.95	0.70	110.25	0.41	<LOD	NA	184.98	1.78
T7-RD (25cm)	32803.38	0.47	1164.96	0.84	29.02	0.80	101.45	1.47	<LOD	NA	186.48	2.24
T7-RD (50cm)	32071.00	1.27	1144.31	2.44	27.18	0.84	121.06	1.06	<LOD	NA	178.18	3.77
T7-RE (0-5cm)	32310.06	0.84	1166.55	0.45	26.85	0.62	99.64	0.57	<LOD	NA	182.83	0.56
T7-RE (25cm)	32412.79	0.31	1226.81	2.24	26.55	1.30	96.97	1.22	<LOD	NA	166.49	1.22
T7-RE (50cm)	31087.44	0.30	1211.04	0.49	29.13	1.23	114.70	2.03	<LOD	NA	189.61	0.99
T8-A(0-5cm)	29193.56	2.30	810.15	2.93	18.77	1.38	70.65	1.95	<LOD	NA	159.84	2.33
T8-A(25cm)	23900.82	3.19	652.38	1.67	15.33	3.22	58.95	2.90	<LOD	NA	145.21	1.59
T8-A(50cm)	26527.54	0.71	811.64	0.87	17.39	1.76	64.46	1.75	<LOD	NA	164.27	2.73
T8-A(100-120cm)	28936.07	1.79	906.96	0.83	17.59	0.74	99.23	0.87	<LOD	NA	162.77	2.34
T8-LB(0-5cm)	36259.07	0.80	986.14	1.02	21.04	3.07	91.14	2.12	<LOD	NA	173.21	1.85
T8-LB(25cm)	28992.32	3.97	1052.76	1.88	17.14	1.50	72.60	2.54	<LOD	NA	189.48	0.79
T8-LB(50cm)	30134.76	0.90	930.78	1.38	21.87	1.16	86.27	1.80	<LOD	NA	160.00	2.29
T8-LB(80cm)	30822.14	2.47	743.69	3.73	22.68	1.40	55.76	2.07	<LOD	NA	136.84	1.57
T8-LC(0-5cm)	36922.18	1.35	659.79	0.92	25.85	3.50	51.54	2.07	<LOD	NA	195.27	3.99
T8-LC(90cm)	29412.79	1.90	864.14	0.82	29.79	2.22	46.29	1.66	<LOD	NA	133.12	2.17



Laboratorio Nacional de Geoquímica y Minerología
Universidad Nacional Autónoma de México
Geoquímica Ambiental



ID Campo	Al		As		Ba		Cd		Cr		Cu	
	mg/kg	RSD %	mg/kg	RSD %	mg/kg	RSD %	mg/kg	RSD %	mg/kg	RSD %	mg/kg	RSD %
T8-RB(0-5cm)	14609.63	3.47	23.81	0.48	145.93	3.73	4.24	6.39	16.06	3.61	146.03	2.40
T8-RB(25cm)	12276.21	0.82	22.85	2.06	112.14	0.82	4.25	3.57	13.38	3.40	170.67	2.01
T8-RB(50cm)	14793.48	1.64	25.87	6.64	150.10	1.73	5.82	3.96	29.47	4.79	330.05	0.60
T8-RB(100cm)	13061.80	1.73	25.16	1.81	140.29	1.81	4.03	4.71	15.29	2.91	112.50	3.16
T9-A (0-5cm)	28303.09	1.12	26.71	6.84	317.91	1.10	4.61	7.06	38.72	1.87	489.09	3.65
T9-A (5-25cm)	21161.57	0.74	32.73	3.33	221.21	0.77	5.23	4.92	40.12	1.21	496.24	2.44
T9-A (25-50cm)	20188.63	1.18	30.51	10.3 4	212.78	1.30	4.64	4.40	36.60	4.03	328.14	2.14
T9-A (50-100cm)	18783.37	3.27	28.15	2.62	202.80	3.49	4.64	3.28	37.91	0.94	332.39	1.67
T9-A (100-150cm)	19361.98	1.46	126.22	0.74	212.65	1.57	116.13	1.26	146.57	1.23	373.82	1.81
T9-A (150-170cm)	20539.34	0.23	29.79	9.39	245.19	0.37	4.11	3.80	35.00	1.00	191.40	1.18
T9-A (170-200cm)	25579.68	0.52	25.86	8.45	283.42	0.63	4.29	2.68	39.49	1.75	138.12	1.23
T9-A (+200cm)	24712.52	2.57	18.30	7.13	308.87	2.86	4.06	1.16	37.70	1.18	106.68	0.57
T9-LB (0-5cm)	13426.06	2.08	23.44	3.46	204.57	2.20	4.60	2.15	34.45	3.74	131.23	3.94
T9-LB (5-25cm)	14327.07	1.23	23.51	3.86	196.50	1.17	4.58	0.46	35.25	0.58	105.71	0.63
T9-LB (+200cm)	30664.05	1.65	24.49	10.1 2	301.18	1.69	4.90	1.50	51.91	3.02	166.66	3.13
T9-LB (25-50cm)	21635.55	1.83	24.12	4.35	292.20	1.88	4.38	1.38	32.98	4.97	125.62	4.40
T9-LB (50-100cm)	2075.62	1.85	2.73	3.57	26.91	1.94	0.57	6.04	5.63	4.13	10.52	3.88
T9-LB (100-150cm)	18264.79	0.19	24.74	5.31	210.94	0.22	4.79	3.33	31.07	3.43	336.47	3.26
T9-LB (150-200cm)	26728.85	0.74	20.61	4.82	271.73	0.77	4.67	1.04	36.71	0.26	623.98	0.98
T9-RB (0-5cm)	18473.56	3.46	32.13	8.30	297.94	3.73	6.25	1.74	89.25	1.21	212.32	1.20
T9-RB (5-25cm)	18524.65	1.14	28.58	4.97	190.68	1.19	4.01	1.48	24.50	2.09	289.35	1.48
T9-RB (25-50cm)	14442.98	1.94	27.16	3.62	186.33	2.14	3.68	0.97	19.28	1.83	307.23	1.10
T9-RB (50-100cm)	16018.47	2.56	28.63	6.95	210.30	2.82	4.44	1.92	29.45	1.02	237.44	0.59
T9-RB (100-150cm)	20247.71	1.51	26.11	5.30	240.25	1.62	4.32	1.55	34.74	2.57	182.25	1.95
T9-RB (150-200cm)	28965.98	1.25	20.96	5.07	299.70	1.37	4.15	2.30	39.22	1.25	92.97	1.58
T9-RB (+200cm)	21563.79	2.25	23.03	6.36	232.40	2.47	3.48	0.62	28.19	3.65	126.81	3.54



ID Campo	Fe		Mn		Ni		Pb		Sb		Zn	
	mg/kg	RSD %	mg/kg	RSD %	mg/kg	RSD %	mg/kg	RSD %	mg/kg	RSD %	mg/kg	RSD %
T8-RB(0-5cm)	24411.30	4.36	702.47	2.41	15.38	0.51	61.31	1.23	<LOD	NA	130.43	2.50
T8-RB(25cm)	20511.20	0.84	617.82	1.14	13.85	1.84	59.67	1.05	<LOD	NA	128.90	2.29
T8-RB(50cm)	30252.04	1.95	818.81	0.53	19.01	0.70	85.35	0.77	<LOD	NA	162.22	4.43
T8-RB(100cm)	23644.59	2.11	644.90	1.39	15.77	0.55	58.00	0.69	<LOD	NA	132.14	3.17
T9-A (0-5cm)	34318.37	1.26	1182.35	0.45	29.90	4.21	83.70	1.77	<LOD	NA	202.64	1.98
T9-A (5-25cm)	36502.03	0.14	1062.60	0.40	26.36	0.50	85.38	1.45	<LOD	NA	216.14	1.39
T9-A (25-50cm)	33879.59	0.67	956.43	1.07	24.43	2.50	81.66	1.99	<LOD	NA	192.19	3.74
T9-A (50-100cm)	34185.99	0.19	932.31	1.58	25.60	0.68	74.98	1.98	<LOD	NA	193.55	0.63
T9-A (100-150cm)	32762.72	1.01	1202.90	1.40	143.54	1.13	192.79	1.00	<LOD	NA	296.63	1.37
T9-A (150-170cm)	28537.74	0.93	956.69	0.84	33.29	1.27	72.00	2.09	<LOD	NA	170.52	1.18
T9-A (170-200cm)	31818.62	1.06	896.74	0.51	30.39	0.62	59.25	1.65	<LOD	NA	157.37	1.39
T9-A (+200cm)	31359.42	0.77	1210.68	1.00	32.26	1.18	59.74	0.80	<LOD	NA	148.41	1.03
T9-LB (0-5cm)	31021.49	2.45	990.54	1.97	21.46	1.61	78.94	0.48	<LOD	NA	146.04	4.10
T9-LB (5-25cm)	33005.26	1.27	934.13	0.90	19.96	1.41	89.50	1.90	<LOD	NA	142.59	0.38
T9-LB (+200cm)	36298.23	1.01	1088.49	3.55	36.00	1.09	70.46	0.74	<LOD	NA	185.85	2.89
T9-LB (25-50cm)	31353.83	2.21	1113.15	1.01	21.28	1.63	78.96	0.98	<LOD	NA	144.95	4.31
T9-LB (50-100cm)	4102.88	2.06	109.40	0.67	2.34	2.84	8.55	2.81	<LOD	NA	15.65	4.12
T9-LB (100-150cm)	26634.33	0.93	1001.71	1.85	21.08	1.33	75.38	1.20	<LOD	NA	173.89	3.32
T9-LB (150-200cm)	32131.76	0.75	1251.47	1.05	33.11	1.91	73.31	2.92	<LOD	NA	187.21	0.35
T9-RB (0-5cm)	49119.10	1.61	1503.67	1.93	33.49	0.72	132.65	0.93	<LOD	NA	200.02	1.18
T9-RB (5-25cm)	28630.04	1.49	883.53	1.52	22.22	0.66	78.15	0.97	<LOD	NA	170.26	1.90
T9-RB (25-50cm)	26184.23	1.33	906.60	0.22	22.47	1.24	68.20	0.25	<LOD	NA	168.70	1.11
T9-RB (50-100cm)	30295.14	0.35	1073.80	1.67	24.30	2.19	71.92	1.37	<LOD	NA	191.28	0.86
T9-RB (100-150cm)	32183.15	0.55	1076.57	0.71	27.38	1.20	71.61	1.71	<LOD	NA	177.60	1.74
T9-RB (150-200cm)	31955.67	0.81	1040.52	1.08	30.17	2.51	61.98	1.64	<LOD	NA	164.29	1.31
T9-RB (+200cm)	26878.05	0.26	798.46	1.97	23.75	0.75	58.32	1.25	<LOD	NA	141.66	3.46

CONTROL DE CALIDAD

En el caso de los análisis determinados por ICP-OES la concentración de cada elemento fue determinada por triplicado, el valor reportado es el promedio de las tres determinaciones reportando también la desviación estándar relativa (RSD) de las mediciones.



Laboratorio Nacional de Geoquímica y Minerología
Universidad Nacional Autónoma de México
Geoquímica Ambiental



Para determinar la exactitud se utilizaron estándares de control analítico de concentraciones conocidas (50 y 5 ppm) los cuales fueron analizados como muestra para determinar su concentración por medio de curvas de calibración preparadas, indicando un buen desempeño del método de análisis.

% exactitud	Al	As	Ba	Cd	Cr	Cu	Fe	Mn	Ni	Pb	Sb	Zn
50 ppm	93.28	90.85	102.49	91.18	94.26	98.58	95.88	95.82	94.04	92.25	90.92	90.58
5 ppm	94.87	100.06	102.05	107.63	110.96	99.49	107.45	105.74	104.11	107.26	100.50	107.96

Sin mas por al momento quedo a sus ordenes.

Analista:

Responsable tecnico:

QFB. Fabiola Vega García

M en C Luis Gerardo Martines Jardines

QA. Daniel Ramos Pérez

M en C Alicia Santana Silva



**INFORME DE RESULTADOS ICP-OES
BACANUCHI**

Datos del solicitante:

Dr. Francisco Martín Romero correo electrónico: fmrch@geologia.unam.mx, fmrch@hotmail.com

Dirección: Instituto de Geología, UNAM. Teléfono: 56224386 ext 129

Información de las muestras

Fecha de recepción de muestras: 13 de julio del 2015

Se recibieron 228 muestras de suelos de Bacanuchi. Las muestras se recibieron en bolsas de plástico de 25X10 cm.

Información de los análisis

En las 228 muestras se determinaron elementos traza por Espectrometría de Emisión Óptica con Plasma Inductivamente Acoplado (ICP-OES) en un equipo Pekin Elmer serie 8300.

Las muestras fueron digeridas por el método EPA 3051, los resultados se reportan en mg/kg.

Modo de inyección : Cámara ciclónica.

Límites de detección :

Los límites considerados son para modo de inyección cámara ciclónica y están reportados en mg/L.

LD mg/L	Al	As	Ba	Cd	Cr	Cu	Fe	Mn	Ni	Pb	Sb	Zn
	0.08	0.07	0.01	0.02	0.003	0.122	0.01	0.007	0.01	0.03	0.1	0.007

ID Campo	coordenadas		ID Campo	coordenadas		ID Campo	coordenadas	
	X	Y		X	Y		X	Y
B1-A (0-5cm)	565688	3400681	B1-LB (100cm)	565676	3400682	B1-LD (50cm)	565657	3400666
B1-A (25cm)	565688	3400681	B1-LB (150cm)	565676	3400682	B1-LD (80cm)	565657	3400666
B1-A (50cm)	565688	3400681	B1-LB (200cm)	565676	3400682	B1-LE (0-5cm)	565616	3400663
B1-A (100cm)	565688	3400681	B1-LB (250cm)	565676	3400682	B1-LE (25cm)	565616	3400663
B1-A (150cm)	565688	3400681	B1-LB (300cm)	565676	3400682	B1-LE (50cm)	565616	3400663
B1-A (200cm)	565688	3400681	B1-LC (0-5cm)	565680	3400673	B1-LE (80cm)	565616	3400663
B1-A (250cm)	565688	3400681	B1-LC (25cm)	565680	3400673	B1-RB (0-5 cm)	565692	3400687
B1-A (300cm)	565688	3400681	B1-LC (50cm)	565680	3400673	B1-RB (25 cm)	565692	3400687
B1-LB (0-5cm)	565676	3400682	B1-LC (100cm)	565680	3400673	B1-RB (50 cm)	565692	3400687
B1-LB (25cm)	565676	3400682	B1-LD (0-5cm)	565657	3400666	B1-RB (100 cm)	565692	3400687
B1-LB (50cm)	565676	3400682	B1-LD (25cm)	565657	3400666	B1-RB (150 cm)	565692	3400687



Laboratorio Nacional de Geoquímica y Minerología
Universidad Nacional Autónoma de México
Geoquímica Ambiental



ID Campo	coordenadas		ID Campo	coordenadas		ID Campo	coordenadas	
	X	Y		X	Y		X	Y
B1-RB (200 cm)	565692	3400687	B2-RB(25cm)	566485	3397616	B3-LE (50cm)	567606	3395844
B1-RB (250 cm)	565692	3400687	B2-RB(50cm)	566485	3397616	B3-RB (0-5cm)	567656	3395867
B1-RB (300 cm)	565692	3400687	B2-RB(100cm)	566485	3397616	B3-RB (25cm)	567656	3395867
B1-RB (350 cm)	565692	3400687	B2-RB(150cm)	566485	3397616	B3-RB (50cm)	567656	3395867
B1-RC (0-5 cm)	565697	3400683	B2-RB(200cm)	566485	3397616	B3-RB (100cm)	567656	3395867
B1-RC (25 cm)	565697	3400683	B2-RB(250cm)	566485	3397616	B3-RB (200cm)	567656	3395867
B1-RC (50 cm)	565697	3400683	B2-RC(0-5cm)	566506	3397619	B3-RB (300cm)	567656	3395867
B1-RD (0-5 cm)	565710	3400691	B2-RC(25cm)	566506	3397619	B3-RC (0-5cm)	567658	3395870
B1-RD (25 cm)	565710	3400691	B2-RC(50cm)	566506	3397619	B3-RC (25cm)	567658	3395870
B1-RD (50 cm)	565710	3400691	B2-RC(100cm)	566506	3397619	B3-RC (50cm)	567658	3395870
B1-RE (0-5 cm)	565753	3400701	B3-A (0-5cm)	567647	3395869	B3-RD (0-5cm)	567614	3395871
B1-RE (25 cm)	565753	3400701	B3-A (25cm)	567647	3395869	B3-RD (25cm)	567614	3395871
B1-RE (50 cm)	565753	3400701	B3-A (50cm)	567647	3395869	B3-RD (50cm)	567614	3395871
B2-A(0-5cm)	566472	3397612	B3-A (100cm)	567647	3395869	B3-RE (0-5cm)	567690	3395883
B2-A(25cm)	566472	3397612	B3-A (200cm)	567647	3395869	B3-RE (25cm)	567690	3395883
B2-A(40-50cm)	566472	3397612	B3-A (300cm)	567647	3395869	B3-RE (50cm)	567690	3395883
B2-A(50-100cm)	566472	3397612	B3-LB (0-5cm)	567641	3395858	B4-A(0-5cm)	570840	3391618
B2-A(150cm)	566472	3397612	B3-LB (5-25cm)	567641	3395858	B4-A(25cm)	570840	3391618
B2-A(200cm)	566472	3397612	B3-LB (25-50cm)	567641	3395858	B4-A(50cm)	570840	3391618
B2-A(250cm)	566472	3397612	B3-LB (50-100cm)	567641	3395858	B4-A(55-65cm)	570840	3391618
B2-A(270cm)	566472	3397612	B3-LB (100-150cm)	567641	3395858	B4-A(100cm)	570840	3391618
B2-LB(0-5cm)	566458	3397596	B3-LB (150-200cm)	567641	3395858	B4-A(150cm)	570840	3391618
B2-LB(25cm)	566458	3397596	B3-LB (200-250cm)	567641	3395858	B4-A(190cm)	570840	3391618
B2-LB(50cm)	566458	3397596	B3-LB (250-300cm)	567641	3395858	B4-LB(0-5cm)	570837	3391620
B2-LB(100cm)	566458	3397596	B3-LB (>300cm)	567641	3395858	B4-LB(20-70cm)	570837	3391620
B2-LB(150cm)	566458	3397596	B3-LC (0-5cm)	567629	3395858	B4-LB(70-140cm)	570837	3391620
B2-LB(200cm)	566458	3397596	B3-LC (25cm)	567629	3395858	B4-LB(140-190cm)	570837	3391620
B2-LC(0-5cm)	566436	3397596	B3-LC (50cm)	567629	3395858	B4-LB(190-240cm)	570837	3391620
B2-LC(25cm)	566436	3397596	B3-LD (0-5cm)	567618	3395849	B4-LB(240-260cm)	570837	3391620
B2-LC(50cm)	566436	3397596	B3-LD (25cm)	567618	3395849	B4-LC(0-5cm)	570832	3391630
B2-LC(100cm)	566436	3397596	B3-LD (50cm)	567618	3395849	B4-LC(25cm)	570832	3391630
B2-LC(150cm)	566436	3397596	B3-LE (0-5cm)	567606	3395844	B4-LC(50cm)	570832	3391630
B2-RB(0-5cm)	566485	3397616	B3-LE (25cm)	567606	3395844	B4-LC(100cm)	570832	3391630



Laboratorio Nacional de Geoquímica y Minerología
Universidad Nacional Autónoma de México
Geoquímica Ambiental



ID Campo	coordenadas		ID Campo	coordenadas		ID Campo	coordenadas	
	X	Y		X	Y		X	Y
B4-LD(0-5cm)	570769	3391604	B6-RC(5-30cm)	573206	3384475	B6-RC(30-60cm)	573206	3384475
B4-LD(25cm)	570769	3391604	B5-LB (50cm)	571512	3388316	B6-RC(60-80cm)	573206	3384475
B4-LD(50cm)	570769	3391604	B5-LB (100cm)	571512	3388316	B6-RC(80-110cm)	573206	3384475
B4-LE(0-5cm)	570663	3391542	B5-LB (150cm)	571512	3388316	B6-LC(0-5cm)	573182	3384455
B4-LE(25cm)	570663	3391542	B5-LB (200cm)	571512	3388316	B6-LC(5-30cm)	573182	3384455
B4-LE(50cm)	570663	3391542	B5-LB (300cm)	571512	3388316	B6-LC(30-60cm)	573182	3384455
B4-RB(0-5cm)	570845	3391625	B5-LB (350cm)	571512	3388316	B6-LC(60-85cm)	573122	3384455
B4-RB(25cm)	570845	3391625	B5-LC (5cm)	571494	3388317	B6-LC(85-100cm)	573122	3384455
B4-RB(50cm)	570845	3391625	B5-LC (25cm)	571494	3388317	B7-A (0-5cm)	579555	3377102
B4-RB(100cm)	570845	3391625	B5-LC (50cm)	571494	3388317	B7-LB (0-5cm)	579563	3376890
B4-RB(150cm)	570845	3391625	B5-LD (5cm)	571427	3388322	B7-LC (0-5cm)	579547	3376894
B4-RC(0-5cm)	570859	3391622	B5-LD (25cm)	571427	3388322	B7-LC (25cm)	579547	3376894
B4-RC(25cm)	570859	3391622	B5-LD (50cm)	571427	3388322	B7-LC (50cm)	579547	3376894
B4-RC(50cm)	570859	3391622	B5-RB(0-5 cm)	571546	3388297	B7-LC (100cm)	579547	3376894
B4-RC(100cm)	570859	3391622	B5-RB(25cm)	571546	3388297	B7-LD (0-5cm)	579472	3376877
B4-RD(0-5cm)	570888	3391639	B5-RB(50cm)	571546	3388297	B7-LD (30cm)	579472	3376877
B4-RD(25cm)	570888	3391639	B5-RB(100cm)	571546	3388297	B7-RB (0-5cm)	579563	3376890
B4-RD(50cm)	570888	3391639	B5-RB(200cm)	571546	3388297	B7-RC (0-5cm)	579569	3376887
B4-RE(0-5cm)	570905	3391665	B5-RB(300cm)	571546	3388297	B7-RC (25cm)	579569	3376887
B4-RE(25cm)	570905	3391665	B5-RC(0-5cm)	571551	3388285	B7-RC (50cm)	579569	3376887
B4-RE(50cm)	570905	3391665	B5-RC(25cm)	571551	3388285	B8-A (0-5cm)	581288	3368504
B5-A(0-5cm)	571534	3388308	B5-RC(50cm)	571551	3388285	B8-LB (0-5cm)	581282	3368512
B5-A(10cm)	571534	3388308	B5-RD(0-5cm)	571675	3388301	B8-LC (0-5cm)	581285	3368511
B5-A(25cm)	571534	3388308	B5-RD(25cm)	571675	3388301	B8-LC (5-25cm)	581285	3368511
B5-A(50cm)	571534	3388308	B5-RD(50cm)	571675	3388301	B8-LC (25-50cm)	581285	3368511
B5-A(100cm)	571534	3388308	B5-RD'(0-5cm)	571600	3388302	B8-LC (50-75cm)	581285	3368511
B5-A(150cm)	571534	3388308	B5-RD'(25cm)	571600	3388302	B8-LC (+75cm)	581285	3368511
B5-A(200cm)	571534	3388308	B5-RD'(50cm)	571600	3388302	B8-RB (0-5cm)	581289	3368506
B5-A(>300cm)	571534	3388308	B6-A(0-5cm)	573192	3384461	B8-RC (0-5cm)	581295	3368504
B5-LB (0-10cm)	571512	3388316	B6-LB	573184	3384456	B8-RC (5-25cm)	581295	3368504
B5-LB (10cm)	571512	3388316	B6-RB	573150	3384464	B8-RC (25-50cm)	581295	3368504
B5-LB (25cm)	571512	3388316	B6-RC(0-5cm)	573206	3384475	B8-RC (+50cm)	581295	3368504



Laboratorio Nacional de Geoquímica y Minerología
Universidad Nacional Autónoma de México
Geoquímica Ambiental



Resultados:

ID Campo	Al		As		Ba		Cd		Cr		Cu	
	mg/kg	RSD %	mg/kg	RSD %	mg/kg	RSD %	mg/kg	RSD %	mg/kg	RSD %	mg/kg	RSD %
B1-A (0-5cm)	15471.46	0.95	19.14	2.97	203.31	0.99	4.78	2.97	69.23	1.06	168.59	1.31
B1-A (25cm)	20867.54	1.63	20.74	1.57	229.87	1.75	4.35	1.57	53.71	1.17	166.49	1.63
B1-A (50cm)	19677.02	1.25	19.59	1.99	221.57	1.28	4.06	1.99	53.99	1.20	145.00	1.74
B1-A (100cm)	22003.65	1.16	20.05	2.15	219.53	1.22	3.95	2.15	59.55	2.88	229.76	2.87
B1-A (150cm)	37855.64	0.85	17.91	2.68	349.50	0.90	5.02	2.68	40.66	0.81	132.47	0.67
B1-A (200cm)	23474.33	1.35	12.63	1.77	246.77	1.37	3.78	1.77	42.86	0.36	55.44	1.25
B1-A (250cm)	20659.83	1.80	10.50	1.15	225.78	1.90	3.70	1.15	61.29	0.80	92.77	0.16
B1-A (300cm)	22111.78	1.51	10.94	1.95	235.17	1.53	3.71	1.95	83.71	1.03	27.55	1.58
B1-LB (0-5cm)	15508.74	2.23	25.32	1.54	234.22	2.34	3.54	1.54	22.39	1.67	204.70	1.23
B1-LB (25cm)	21087.69	1.22	40.95	1.59	263.18	1.21	4.69	1.59	51.85	1.26	293.74	1.50
B1-LB (50cm)	17285.39	2.64	22.50	1.59	251.44	2.80	4.83	1.59	40.27	0.88	175.85	1.03
B1-LB (100cm)	21197.70	2.03	20.77	0.98	262.89	2.23	4.69	0.98	30.99	0.82	399.38	0.31
B1-LB (150cm)	19546.96	1.25	21.36	0.66	231.96	1.32	4.84	0.66	35.12	2.31	337.98	2.33
B1-LB (200cm)	18005.91	1.11	19.22	2.89	250.60	1.24	4.93	2.89	34.08	1.24	138.01	0.67
B1-LB (250cm)	25149.64	0.85	18.49	2.57	312.64	0.91	5.04	2.57	44.98	1.21	88.41	1.49
B1-LB (300cm)	23716.40	0.81	15.62	1.75	302.09	0.88	4.30	1.75	36.25	3.67	57.46	3.70
B1-LC (0-5cm)	18288.44	1.94	25.69	2.42	290.30	2.14	7.98	2.42	78.88	2.56	146.88	2.50
B1-LC (25cm)	23431.04	1.25	23.00	2.92	316.44	1.35	5.41	2.92	39.28	2.12	118.50	1.35
B1-LC (50cm)	17117.43	1.31	21.34	2.66	309.95	1.34	4.68	2.66	31.49	2.84	84.52	2.81
B1-LC (100cm)	25092.16	1.36	23.22	4.22	342.00	1.46	5.57	4.22	40.40	1.15	100.70	1.06
B1-LD (0-5cm)	21831.88	1.83	23.90	3.79	278.88	1.96	5.23	3.79	37.90	1.97	116.19	1.79
B1-LD (25cm)	21972.65	1.92	23.38	2.16	285.15	1.99	5.49	2.16	41.84	1.16	100.39	0.93
B1-LD (50cm)	22405.07	1.59	25.38	3.56	292.80	1.73	5.02	3.56	39.56	1.48	116.41	1.37
B1-LD (80cm)	23020.10	0.87	25.13	0.85	320.63	0.89	5.66	0.85	49.07	1.50	182.07	1.24
B1-LE (0-5cm)	22361.18	2.08	20.04	0.94	264.00	2.23	4.57	0.94	52.33	1.74	91.61	2.08
B1-LE (25cm)	28985.28	2.86	20.25	1.98	323.56	2.98	4.58	1.98	40.54	1.80	87.53	1.97
B1-LE (50cm)	24363.74	2.65	15.16	3.73	265.99	2.73	4.58	3.73	52.61	2.25	72.28	2.80
B1-LE (80cm)	25458.20	1.01	20.33	0.77	291.23	1.07	4.64	0.77	57.60	1.64	131.30	1.90
B1-RB (0-5 cm)	19775.62	2.16	23.36	4.91	273.73	2.38	5.74	4.91	76.45	1.05	170.90	1.62
B1-RB (25 cm)	18427.51	1.38	19.03	2.61	214.54	1.44	4.00	2.61	44.85	0.46	168.95	0.75
B1-RB (50 cm)	21607.68	3.01	19.29	0.18	246.43	3.28	4.34	0.18	47.61	0.98	112.62	1.37
B1-RB (100 cm)	16286.22	1.38	22.74	1.26	216.02	1.42	4.24	1.26	56.28	2.78	103.91	2.92
B1-RB (150 cm)	18260.50	0.21	20.81	3.74	227.26	0.17	4.06	3.74	44.89	2.42	142.27	2.78



Laboratorio Nacional de Geoquímica y Minerología
Universidad Nacional Autónoma de México
Geoquímica Ambiental



ID Campo	Fe		Mn		Ni		Pb		Sb		Zn	
	mg/kg	RSD %	mg/kg	RSD %	mg/kg	RSD %	mg/kg	RSD %	mg/kg	RSD %	mg/kg	RSD %
B1-A (0-5cm)	33344.47	0.80	857.40	2.30	25.47	0.69	74.39	0.46	<LOD	NA	160.23	0.95
B1-A (25cm)	29581.43	0.79	831.42	1.02	25.90	0.29	57.96	2.00	<LOD	NA	154.00	1.16
B1-A (50cm)	27804.76	0.95	847.07	1.22	23.72	0.90	55.28	1.26	<LOD	NA	147.26	1.58
B1-A (100cm)	28634.22	0.56	843.41	0.31	25.11	0.61	63.96	0.41	<LOD	NA	149.96	2.67
B1-A (150cm)	31788.32	0.42	1288.54	0.58	40.41	0.36	61.61	2.56	<LOD	NA	186.36	0.75
B1-A (200cm)	28732.92	1.19	761.00	0.58	26.77	1.02	39.36	1.29	<LOD	NA	121.94	0.53
B1-A (250cm)	27641.35	1.49	692.75	0.71	25.76	1.42	32.90	0.38	3.67	7.67	126.42	0.34
B1-A (300cm)	29359.11	0.33	740.94	1.69	25.02	1.28	43.88	1.10	<LOD	NA	125.47	1.22
B1-LB (0-5cm)	26538.59	0.79	855.23	0.72	26.53	1.98	68.01	1.58	<LOD	NA	157.91	1.62
B1-LB (25cm)	40295.14	0.24	785.27	1.27	30.62	0.97	82.95	1.04	<LOD	NA	169.62	1.35
B1-LB (50cm)	36455.87	0.27	1051.23	0.70	28.31	1.42	62.82	0.90	<LOD	NA	172.11	1.09
B1-LB (100cm)	33206.19	1.08	1171.34	1.52	30.43	0.66	65.57	0.16	<LOD	NA	181.34	0.60
B1-LB (150cm)	34493.71	1.14	1130.62	0.89	30.31	0.26	69.31	0.09	<LOD	NA	193.54	2.63
B1-LB (200cm)	30923.09	0.29	1090.34	1.50	33.29	1.99	56.42	1.55	<LOD	NA	190.57	0.40
B1-LB (250cm)	38686.85	0.37	1202.07	1.78	35.78	0.57	65.91	0.84	<LOD	NA	173.04	1.07
B1-LB (300cm)	35334.65	0.90	924.23	0.98	30.53	1.07	43.78	1.61	<LOD	NA	124.24	2.95
B1-LC (0-5cm)	45828.02	1.59	1205.96	1.26	35.44	0.94	93.90	0.07	<LOD	NA	198.84	2.72
B1-LC (25cm)	32505.26	0.36	1078.23	1.71	29.06	0.74	76.03	1.23	<LOD	NA	172.68	1.58
B1-LC (50cm)	29345.19	0.40	1022.88	0.52	26.47	2.48	73.91	2.79	<LOD	NA	151.68	3.13
B1-LC (100cm)	32921.07	1.55	1172.08	1.17	26.94	0.98	79.35	0.43	<LOD	NA	164.77	0.96
B1-LD (0-5cm)	33322.62	0.63	1031.42	0.41	27.54	0.82	70.99	0.69	<LOD	NA	162.78	2.23
B1-LD (25cm)	33727.28	1.01	1071.05	1.91	29.29	0.42	85.63	0.97	<LOD	NA	162.26	0.83
B1-LD (50cm)	32444.98	0.54	1072.92	2.17	27.30	1.18	74.52	0.32	<LOD	NA	153.73	1.36
B1-LD (80cm)	35131.16	1.33	1088.57	1.32	30.45	1.58	88.47	3.02	<LOD	NA	151.73	1.33
B1-LE (0-5cm)	32486.73	0.29	956.40	1.42	34.16	1.94	60.92	2.42	<LOD	NA	153.72	2.02
B1-LE (25cm)	32662.61	0.87	1106.56	0.93	31.84	1.31	70.49	2.26	<LOD	NA	166.66	1.69
B1-LE (50cm)	33581.81	1.15	941.75	0.99	27.70	0.21	64.04	0.42	<LOD	NA	144.73	2.57
B1-LE (80cm)	33900.84	0.62	975.55	1.55	31.06	1.10	68.10	1.13	<LOD	NA	151.06	1.54
B1-RB (0-5 cm)	42879.99	0.56	1395.62	0.10	32.69	0.28	86.76	0.43	<LOD	NA	188.58	1.27
B1-RB (25 cm)	27817.42	0.22	870.95	1.60	24.13	1.23	50.64	0.48	<LOD	NA	152.74	0.41
B1-RB (50 cm)	31753.44	1.02	1011.58	1.40	27.27	1.18	63.21	1.94	<LOD	NA	147.85	0.89
B1-RB (100 cm)	31787.63	1.07	970.56	0.94	24.60	1.75	64.49	2.50	<LOD	NA	131.11	2.48
B1-RB (150 cm)	30375.05	0.21	934.90	0.43	24.72	0.57	59.75	2.25	<LOD	NA	139.47	2.56



Laboratorio Nacional de Geoquímica y Minerología
Universidad Nacional Autónoma de México
Geoquímica Ambiental



ID Campo	Al		As		Ba		Cd		Cr		Cu	
	mg/kg	RSD %	mg/kg	RSD %	mg/kg	RSD %	mg/kg	RSD %	mg/kg	RSD %	mg/kg	RSD %
B1-RB (200 cm)	29822.79	1.60	21.95	1.89	281.46	1.74	4.79	1.89	46.70	1.12	240.69	1.47
B1-RB (250 cm)	21829.63	0.82	12.27	1.15	252.46	0.91	4.28	1.15	41.88	1.37	330.28	1.82
B1-RB (300 cm)	22406.13	1.55	21.94	0.25	285.20	1.71	5.34	0.25	58.58	0.91	41.18	1.16
B1-RB (350 cm)	20693.07	1.08	13.13	0.99	238.03	1.09	3.42	0.99	50.07	1.38	16.95	4.89
B1-RC (0-5 cm)	29129.46	0.26	21.59	4.56	324.97	0.29	5.17	4.56	57.89	0.68	101.80	0.91
B1-RC (25 cm)	23387.11	2.39	17.26	0.81	274.65	2.58	4.79	0.81	50.17	0.70	164.67	1.05
B1-RC (50 cm)	28085.51	1.97	17.91	3.98	317.98	2.09	4.91	3.98	48.77	1.80	102.73	3.03
B1-RD (0-5 cm)	16861.36	0.99	21.24	1.35	228.98	1.01	4.34	1.35	62.37	2.36	72.42	4.09
B1-RD (25 cm)	22717.37	1.13	17.78	1.32	264.41	1.30	4.60	1.32	46.39	1.23	90.10	1.75
B1-RD (50 cm)	32981.92	2.28	18.27	0.58	358.92	2.40	4.84	0.58	38.53	2.34	90.72	2.81
B1-RE (0-5 cm)	39594.88	0.54	19.39	2.58	349.84	0.65	5.11	2.58	43.96	1.94	88.70	2.85
B1-RE (25 cm)	39156.21	0.59	19.12	2.35	381.67	0.65	4.73	2.35	35.16	0.86	66.67	1.24
B1-RE (50 cm)	40538.89	1.63	22.17	1.15	400.33	1.71	5.08	1.15	39.47	1.65	84.84	2.16
B2-A(0-5cm)	20095.01	2.04	21.36	2.68	223.69	2.21	5.23	2.68	33.33	1.66	208.50	2.12
B2-A(25cm)	15423.05	3.64	26.05	3.41	168.56	4.03	4.13	3.41	22.66	1.43	156.01	1.89
B2-A(40-50cm)	18059.96	1.47	49.81	1.55	249.59	1.51	5.68	1.55	34.68	1.45	177.49	1.46
B2-A(50-100cm)	16409.90	1.09	35.20	1.36	199.31	1.11	5.65	1.36	34.45	2.87	193.80	2.76
B2-A(150cm)	52065.93	1.34	13.36	0.86	505.72	1.45	5.58	0.86	29.98	1.53	135.13	1.28
B2-A(200cm)	40489.50	1.15	14.22	0.99	434.73	1.21	5.21	0.99	30.48	1.10	98.24	0.80
B2-A(250cm)	30123.82	1.49	14.99	1.60	381.28	1.66	4.49	1.60	27.29	0.77	65.82	0.13
B2-A(270cm)	37656.49	0.73	14.51	0.88	472.89	0.79	5.03	0.88	30.11	1.13	79.54	0.52
B2-LB(0-5cm)	18025.18	2.07	20.96	1.87	207.94	2.12	4.05	1.87	27.21	1.87	147.70	1.35
B2-LB(25cm)	18615.04	1.39	23.48	2.57	219.22	1.56	4.62	2.57	30.72	1.38	138.40	0.99
B2-LB(50cm)	22552.96	1.30	21.03	1.44	256.85	1.50	5.19	1.44	38.44	0.92	137.38	0.98
B2-LB(100cm)	13303.80	1.53	19.61	1.02	197.77	1.61	4.39	1.02	33.15	0.93	91.49	1.26
B2-LB(150cm)	26342.41	0.49	17.94	1.70	261.67	0.54	5.09	1.70	39.10	2.39	82.28	2.30
B2-LB(200cm)	22957.84	0.86	16.71	5.54	258.67	0.91	5.95	5.54	52.55	1.20	107.94	1.35
B2-LC(0-5cm)	58377.13	1.30	21.49	5.52	490.47	1.38	5.42	5.52	32.46	1.69	146.49	1.71
B2-LC(25cm)	60451.51	1.31	16.98	2.54	579.49	1.47	5.28	2.54	31.29	0.91	104.72	0.96
B2-LC(50cm)	53630.37	1.22	18.43	1.34	489.58	1.28	4.88	1.34	33.54	0.73	82.81	1.00
B2-LC(100cm)	46281.81	1.31	12.70	1.44	490.70	1.39	5.17	1.44	35.23	2.74	71.55	3.27
B2-LC(150cm)	30285.82	1.81	11.79	2.83	355.42	1.86	4.60	2.83	34.44	1.11	35.71	1.21



Laboratorio Nacional de Geoquímica y Minerología
Universidad Nacional Autónoma de México
Geoquímica Ambiental



ID Campo	Fe		Mn		Ni		Pb		Sb		Zn	
	mg/kg	RSD%	mg/kg	RSD %	mg/kg	%	mg/kg	%	mg/kg	RSD %	mg/kg	RSD %
B1-RB (200 cm)	33078.72	1.27	1111.55	0.50	30.10	0.57	77.77	2.01	<LOD	NA	180.56	1.36
B1-RB (250 cm)	29474.15	0.78	931.74	1.61	29.31	0.93	49.23	1.90	<LOD	NA	143.68	1.78
B1-RB (300 cm)	35714.50	1.08	1131.81	1.98	30.85	2.07	67.12	1.91	<LOD	NA	270.99	2.23
B1-RB (350 cm)	27606.62	1.10	716.09	1.57	23.39	1.89	36.75	2.56	<LOD	NA	107.79	2.49
B1-RC (0-5 cm)	36652.99	1.26	1129.34	1.88	30.59	1.83	80.93	1.27	<LOD	NA	167.12	0.58
B1-RC (25 cm)	34832.91	0.50	1034.14	1.34	30.62	0.97	70.17	1.54	<LOD	NA	148.19	0.91
B1-RC (50 cm)	32833.72	0.56	1100.11	0.76	41.19	0.31	74.27	0.16	<LOD	NA	160.50	2.54
B1-RD (0-5 cm)	31737.90	0.80	944.49	0.54	64.69	0.47	69.23	1.10	<LOD	NA	140.56	2.90
B1-RD (25 cm)	31200.28	1.19	995.97	0.53	37.17	1.60	66.44	1.29	<LOD	NA	152.33	1.27
B1-RD (50 cm)	32453.43	0.87	1207.44	0.73	34.64	0.73	73.42	1.66	<LOD	NA	174.07	2.41
B1-RE (0-5 cm)	33912.57	0.66	1212.72	0.77	38.71	1.19	71.84	2.76	3.75	5.89	194.52	2.37
B1-RE (25 cm)	32321.56	1.22	1238.78	0.56	36.44	0.44	72.75	0.92	<LOD	NA	186.81	1.22
B1-RE (50 cm)	33820.85	0.85	1346.86	1.15	37.50	0.73	89.00	1.52	<LOD	NA	196.68	1.72
B2-A(0-5cm)	29887.72	1.06	881.33	1.72	24.70	0.94	57.03	1.38	<LOD	NA	157.88	1.89
B2-A(25cm)	26306.35	1.11	538.81	0.86	19.03	1.69	47.85	2.75	<LOD	NA	128.94	1.74
B2-A(40-50cm)	37779.55	0.48	504.69	0.96	25.58	2.04	70.04	1.06	<LOD	NA	149.26	1.38
B2-A(50-100cm)	34940.32	0.28	457.07	1.69	23.88	0.45	49.49	2.50	<LOD	NA	131.19	2.72
B2-A(150cm)	33109.53	1.39	1571.62	1.43	43.22	0.58	55.36	0.33	<LOD	NA	221.98	1.68
B2-A(200cm)	33383.10	0.37	1233.46	2.48	36.02	0.17	59.88	1.42	<LOD	NA	175.77	0.89
B2-A(250cm)	29046.33	0.63	1009.07	2.29	33.17	0.43	45.43	1.45	<LOD	NA	139.27	0.70
B2-A(270cm)	32180.90	0.53	1281.91	1.32	35.90	0.76	50.84	1.90	<LOD	NA	154.37	0.60
B2-LB(0-5cm)	27859.64	0.68	827.03	1.85	22.82	1.77	56.33	1.46	<LOD	NA	133.25	1.78
B2-LB(25cm)	30504.96	0.87	882.12	2.61	24.15	0.87	59.98	0.35	<LOD	NA	147.92	1.02
B2-LB(50cm)	33305.71	0.62	874.27	0.22	26.44	1.17	58.62	1.38	<LOD	NA	159.69	1.13
B2-LB(100cm)	29633.13	0.28	936.40	1.15	24.85	1.70	72.75	0.56	<LOD	NA	122.59	0.75
B2-LB(150cm)	32104.30	1.01	880.75	1.54	25.32	1.20	47.71	0.70	<LOD	NA	139.47	2.77
B2-LB(200cm)	41205.51	0.57	1045.82	0.55	28.90	0.54	74.16	0.97	<LOD	NA	150.80	1.32
B2-LC(0-5cm)	34177.89	0.63	1590.94	1.29	37.72	1.08	92.36	0.48	<LOD	NA	244.68	1.85
B2-LC(25cm)	33976.69	0.80	1480.55	1.34	36.65	1.02	82.09	0.94	<LOD	NA	212.91	0.73
B2-LC(50cm)	33961.75	0.70	1232.91	1.04	36.25	0.97	56.81	1.36	<LOD	NA	181.11	0.82
B2-LC(100cm)	32462.26	0.48	1269.10	2.05	39.54	0.44	46.93	1.25	<LOD	NA	153.55	2.97
B2-LC(150cm)	31047.27	0.49	770.22	0.42	30.22	0.51	27.55	1.06	<LOD	NA	101.09	0.71



Laboratorio Nacional de Geoquímica y Minerología
Universidad Nacional Autónoma de México
Geoquímica Ambiental



ID Campo	Al		As		Ba		Cd		Cr		Cu	
	mg/kg	RSD %	mg/kg	RSD %	mg/kg	RSD %	mg/kg	RSD %	mg/kg	RSD %	mg/kg	RSD %
B2-RB(0-5cm)	18110.36	1.10	21.40	2.15	239.33	1.11	5.57	2.15	47.74	2.14	138.28	1.91
B2-RB(25cm)	16821.04	1.35	20.95	0.65	203.63	1.42	4.55	0.65	26.56	1.24	153.31	1.44
B2-RB(50cm)	20693.05	1.41	9.09	5.25	298.08	1.49	5.49	5.25	60.90	1.55	44.82	1.10
B2-RB(100cm)	31522.34	0.34	7.70	0.99	392.87	0.41	4.63	0.99	30.89	0.51	55.88	0.90
B2-RB(150cm)	39926.56	1.15	17.70	2.22	456.21	1.21	4.94	2.22	29.50	0.61	85.96	0.28
B2-RB(200cm)	32720.53	1.72	19.64	1.78	417.18	1.89	4.67	1.78	30.37	1.49	71.13	2.00
B2-RB(250cm)	35357.25	1.64	14.28	0.07	487.98	1.79	4.47	0.07	26.11	1.07	63.74	2.09
B2-RC(0-5cm)	24158.23	0.72	21.33	2.51	251.38	0.76	5.63	2.51	50.81	1.06	258.27	0.83
B2-RC(25cm)	23318.01	0.92	19.65	1.65	247.14	1.08	5.51	1.65	48.24	1.37	294.29	1.01
B2-RC(50cm)	21293.48	4.11	18.95	1.66	256.19	4.48	6.40	1.66	63.67	2.41	275.49	2.32
B2-RC(100cm)	25763.45	0.59	18.42	1.64	281.93	0.61	5.43	1.64	42.39	3.25	189.39	3.55
B3-A (0-5cm)	17740.76	1.16	16.69	2.93	227.02	1.31	5.06	2.93	23.24	0.79	123.42	0.18
B3-A (25cm)	23241.20	2.82	11.04	4.27	265.84	2.98	5.82	4.27	21.42	1.24	79.67	1.31
B3-A (50cm)	19674.93	0.88	19.23	5.66	227.37	0.78	4.89	5.66	28.94	2.50	132.12	1.29
B3-A (100cm)	17464.33	1.04	17.45	3.96	216.40	1.16	5.42	3.96	30.61	2.21	133.61	1.50
B3-A (200cm)	18011.81	3.06	14.74	1.52	221.09	3.21	4.46	1.52	20.32	0.89	108.04	0.98
B3-A (300cm)	29486.69	2.35	15.09	5.27	309.53	2.43	4.88	5.27	21.79	2.50	69.91	1.64
B3-LB (0-5cm)	12879.14	1.37	9.11	1.63	170.13	1.43	3.83	1.63	13.63	2.53	41.23	1.95
B3-LB (5-25cm)	11665.32	0.76	7.58	1.61	148.89	0.72	3.28	1.61	9.99	1.77	29.28	1.34
B3-LB (25-50cm)	10818.51	0.39	10.09	2.77	148.80	0.47	3.13	2.77	11.23	2.36	56.61	1.99
B3-LB (50-100cm)	11366.49	0.77	6.13	1.08	144.62	0.79	3.63	1.08	10.40	3.67	20.39	1.38
B3-LB (100-150cm)	11176.83	2.32	11.50	1.18	145.17	2.38	3.21	1.18	11.62	2.43	71.38	0.84
B3-LB (150-200cm)	8780.05	1.23	8.16	3.88	100.92	1.34	2.48	3.88	9.15	2.06	50.58	2.53
B3-LB (200-250cm)	12109.97	0.28	7.38	2.83	157.80	0.28	3.24	2.83	10.16	1.95	35.78	0.42
B3-LB (250-300cm)	14057.95	2.69	8.13	1.13	179.50	2.78	3.65	1.13	12.92	1.80	36.41	1.14
B3-LB (>300cm)	18041.63	1.91	7.86	1.25	207.74	2.06	4.43	1.25	15.38	3.19	41.07	3.60
B3-LC (0-5cm)	17623.36	1.08	10.71	2.15	262.69	1.16	5.44	2.15	16.38	0.70	19.64	1.02
B3-LC (25cm)	22159.40	2.28	25.06	4.04	335.68	2.53	6.53	4.04	39.43	1.54	98.02	1.67
B3-LC (50cm)	21014.95	0.73	14.40	1.66	278.77	0.80	6.12	1.66	28.30	2.39	292.62	0.58
B3-LD (0-5cm)	19694.28	2.54	16.57	0.89	292.23	2.51	5.97	0.89	26.84	4.05	70.85	4.18
B3-LD (25cm)	18449.10	2.32	13.64	1.67	266.34	2.52	6.26	1.67	31.01	3.48	47.29	3.79
B3-LD (50cm)	16153.84	2.45	9.03	2.36	239.83	2.50	6.02	2.36	38.89	1.38	29.51	1.27



Laboratorio Nacional de Geoquímica y Minerología
Universidad Nacional Autónoma de México
Geoquímica Ambiental



ID Campo	Fe		Mn		Ni		Pb		Sb		Zn	
	mg/kg	RSD %	mg/kg	RSD %	mg/kg	RSD %	mg/kg	RSD %	mg/kg	RSD %	mg/kg	RSD %
B2-RB(0-5cm)	35306.28	0.59	937.54	0.67	27.84	1.76	69.91	0.66	<LOD	NA	149.20	2.00
B2-RB(25cm)	28886.10	0.31	900.35	0.88	24.56	1.41	57.45	1.25	<LOD	NA	138.77	1.66
B2-RB(50cm)	37945.44	0.69	860.03	1.04	33.07	1.26	43.47	2.50	<LOD	NA	114.85	1.39
B2-RB(100cm)	30979.65	0.94	961.46	0.34	33.98	1.42	31.90	0.65	3.85	5.29	120.49	0.69
B2-RB(150cm)	32026.89	0.37	1343.12	1.26	38.16	0.55	60.85	0.42	<LOD	NA	171.36	0.53
B2-RB(200cm)	31149.48	0.31	1013.44	0.57	34.44	1.88	50.99	2.00	<LOD	NA	152.54	1.72
B2-RB(250cm)	28333.04	0.57	1069.23	0.92	35.60	1.24	47.02	0.12	<LOD	NA	139.99	2.26
B2-RC(0-5cm)	37763.70	0.83	943.38	0.58	29.25	0.22	65.58	1.92	<LOD	NA	152.74	0.68
B2-RC(25cm)	37888.46	0.48	952.41	1.03	29.91	0.85	59.23	0.93	<LOD	NA	148.28	0.98
B2-RC(50cm)	42781.83	0.90	1069.29	2.33	31.49	0.75	66.70	1.04	4.02	9.49	159.32	2.65
B2-RC(100cm)	34787.46	0.62	968.33	1.17	27.63	1.07	62.48	0.75	<LOD	NA	146.41	3.63
B3-A (0-5cm)	32122.42	0.84	795.02	1.34	21.74	0.05	48.92	1.49	<LOD	NA	132.75	0.07
B3-A (25cm)	36642.81	0.33	760.34	0.74	20.02	1.47	33.20	4.70	<LOD	NA	124.99	1.35
B3-A (50cm)	31001.08	0.84	818.94	0.80	23.60	0.63	51.23	0.64	<LOD	NA	137.42	1.74
B3-A (100cm)	34803.61	1.16	877.57	1.09	25.19	1.04	53.48	1.78	<LOD	NA	143.43	1.27
B3-A (200cm)	27453.66	0.72	708.29	1.03	21.91	0.37	41.84	1.01	<LOD	NA	121.88	1.17
B3-A (300cm)	29855.42	0.54	831.72	0.68	22.86	1.12	35.45	0.75	<LOD	NA	128.52	1.85
B3-LB (0-5cm)	23558.43	0.37	537.17	0.63	13.90	1.06	24.98	1.87	<LOD	NA	76.58	1.85
B3-LB (5-25cm)	21056.59	0.43	436.44	0.32	12.51	2.08	20.19	4.02	<LOD	NA	68.75	1.44
B3-LB (25-50cm)	19261.42	0.59	492.42	0.78	13.45	1.42	23.15	2.16	<LOD	NA	78.75	1.88
B3-LB (50-100cm)	23005.56	1.33	427.64	0.26	12.32	0.38	16.91	0.58	<LOD	NA	66.52	1.84
B3-LB (100-150cm)	20023.26	1.31	491.25	2.25	14.73	1.92	24.20	1.29	<LOD	NA	83.51	0.78
B3-LB (150-200cm)	16254.75	1.00	361.26	1.06	11.78	1.08	17.34	1.41	<LOD	NA	64.30	2.32
B3-LB (200-250cm)	20246.59	0.81	474.82	1.31	12.89	0.92	17.80	5.67	<LOD	NA	72.52	0.63
B3-LB (250-300cm)	22522.69	0.70	571.42	1.76	14.79	2.06	23.11	1.83	<LOD	NA	80.20	1.42
B3-LB (>300cm)	26286.69	0.40	645.84	1.20	16.67	0.20	24.03	1.74	<LOD	NA	97.07	3.30
B3-LC (0-5cm)	30279.67	0.93	691.68	1.93	16.32	0.55	35.32	3.11	<LOD	NA	103.29	0.84
B3-LC (25cm)	35860.27	1.05	995.26	0.90	28.56	1.14	79.60	0.59	<LOD	NA	167.69	1.53
B3-LC (50cm)	37271.19	1.24	903.87	2.35	21.49	0.50	76.94	1.90	<LOD	NA	142.00	2.57
B3-LD (0-5cm)	32391.52	0.46	916.86	0.60	24.60	1.26	46.62	0.73	<LOD	NA	143.47	4.03
B3-LD (25cm)	34386.31	1.20	884.83	0.46	26.20	0.67	47.00	1.31	<LOD	NA	136.18	3.30
B3-LD (50cm)	35550.26	0.70	856.90	0.15	26.86	1.94	47.90	2.59	<LOD	NA	125.58	0.51



Laboratorio Nacional de Geoquímica y Minerología
Universidad Nacional Autónoma de México
Geoquímica Ambiental



ID Campo	Al		As		Ba		Cd		Cr		Cu	
	mg/kg	RSD %	mg/kg	RSD %	mg/kg	RSD %	mg/kg	RSD %	mg/kg	RSD %	mg/kg	RSD %
B3-LE (0-5cm)	18142.69	1.19	16.52	2.22	536.05	1.39	4.63	2.22	16.65	0.87	21.83	1.99
B3-LE (25cm)	17210.32	2.07	19.85	2.38	468.87	2.17	4.93	2.38	19.13	1.80	15.79	1.63
B3-LE (50cm)	18654.96	0.89	22.05	2.20	562.05	0.83	4.60	2.20	17.19	0.77	10.30	4.83
B3-RB (0-5cm)	13570.19	2.92	13.57	1.59	175.80	3.13	4.06	1.59	22.18	2.86	133.49	3.38
B3-RB (25cm)	15119.33	1.38	13.05	1.77	161.61	1.53	3.57	1.77	16.73	2.37	126.56	1.40
B3-RB (50cm)	13198.96	2.11	12.89	2.46	154.43	2.21	3.66	2.46	16.48	3.70	124.65	2.74
B3-RB (100cm)	12272.55	0.07	14.08	0.91	161.77	0.14	3.59	0.91	13.35	2.66	115.04	2.26
B3-RB (200cm)	13573.24	0.75	10.23	1.30	153.35	0.89	2.90	1.30	13.25	1.75	88.61	0.78
B3-RB (300cm)	14070.25	1.26	8.32	1.07	193.10	1.43	3.07	1.07	16.95	3.47	27.82	3.68
B3-RC (0-5cm)	20715.41	0.94	17.93	0.28	220.68	0.99	6.36	0.28	34.55	1.13	163.02	1.29
B3-RC (25cm)	17549.77	3.15	23.48	1.19	220.11	3.30	6.02	1.19	30.84	1.77	144.35	1.79
B3-RC (50cm)	16670.05	1.12	18.33	1.64	215.94	1.32	5.49	1.64	22.61	2.03	143.86	2.50
B3-RD (0-5cm)	24911.06	1.86	9.16	1.35	283.95	1.95	4.99	1.35	17.35	2.43	186.27	3.10
B3-RD (25cm)	41921.45	1.13	14.39	1.34	597.61	1.21	5.25	1.34	25.74	0.87	213.39	1.36
B3-RD (50cm)	31363.47	1.89	13.57	4.37	441.85	2.02	4.99	4.37	22.76	1.79	178.09	4.50
B3-RE (0-5cm)	18145.10	1.24	5.54	6.06	221.73	1.26	4.35	6.06	13.51	1.53	22.21	1.04
B3-RE (25cm)	25015.82	2.09	8.99	0.99	276.58	2.20	4.33	0.99	15.39	1.38	25.87	1.69
B3-RE (50cm)	21580.46	1.67	7.26	3.52	249.16	1.73	4.34	3.52	14.45	1.46	24.04	1.36
B4-A(0-5cm)	20869.97	1.62	26.43	4.18	304.38	1.71	6.64	4.18	34.37	3.05	85.71	2.43
B4-A(25cm)	12228.34	1.50	18.30	2.40	209.35	1.57	4.75	2.40	18.39	2.84	89.83	2.85
B4-A(50cm)	10938.13	1.61	20.22	2.22	188.92	1.66	3.93	2.22	12.35	2.07	89.45	2.22
B4-A(55-65cm)	21921.40	1.92	33.35	1.12	266.15	2.07	6.62	1.12	20.24	2.11	289.51	2.65
B4-A(100cm)	14690.48	1.72	20.04	2.34	200.74	1.79	4.45	2.34	14.89	2.34	103.28	2.22
B4-A(150cm)	13389.46	0.85	17.73	1.94	181.52	0.80	4.03	1.94	12.83	2.55	83.58	2.16
B4-A(190cm)	16835.06	2.00	13.00	2.33	189.74	2.09	3.97	2.33	12.97	1.38	42.76	1.67
B4-LB(0-5cm)	15837.93	2.48	19.84	2.47	270.97	2.59	5.30	2.47	29.43	0.79	102.48	1.29
B4-LB(20-70cm)	18168.33	3.27	19.41	1.34	288.26	3.49	5.13	1.34	26.43	1.29	89.50	1.39
B4-LB(70-140cm)	20356.85	1.23	19.10	2.08	290.75	1.34	5.94	2.08	28.63	1.33	143.72	0.32
B4-LB(140-190cm)	13493.50	1.68	17.32	2.58	216.78	1.80	4.23	2.58	15.28	0.41	42.59	0.78
B4-LB(190-240cm)	23812.19	1.05	18.24	4.31	262.93	1.22	4.38	4.31	17.40	2.00	79.64	1.40
B4-LB(240-260cm)	27285.04	1.90	18.83	2.88	265.32	1.95	4.95	2.88	21.53	1.57	108.21	0.43



Laboratorio Nacional de Geoquímica y Minerología
Universidad Nacional Autónoma de México
Geoquímica Ambiental



ID Campo	Fe		Mn		Ni		Pb		Sb		Zn	
	mg/kg	RSD %	mg/kg	RSD %	mg/kg	RSD %	mg/kg	RSD %	mg/kg	RSD %	mg/kg	RSD %
B3-LE (0-5cm)	22944.00	0.46	747.45	1.82	17.25	1.86	26.83	1.32	<LOD	NA	109.69	1.25
B3-LE (25cm)	24572.24	0.26	732.18	1.04	16.08	1.01	23.85	1.48	<LOD	NA	106.88	1.17
B3-LE (50cm)	22285.35	0.85	855.64	0.68	15.50	1.23	23.53	3.68	<LOD	NA	104.78	1.14
B3-RB (0-5cm)	23287.74	0.88	634.55	1.08	19.19	0.60	40.53	1.21	<LOD	NA	115.36	3.36
B3-RB (25cm)	20041.28	1.35	530.17	2.09	16.36	1.35	29.78	3.08	<LOD	NA	101.09	1.55
B3-RB (50cm)	21683.59	0.93	524.96	2.29	17.43	0.78	27.20	0.95	<LOD	NA	108.22	2.75
B3-RB (100cm)	20963.49	0.50	594.03	1.22	16.69	0.44	34.70	1.74	<LOD	NA	99.26	2.33
B3-RB (200cm)	17978.92	0.37	521.02	1.17	16.58	1.64	27.56	3.63	<LOD	NA	81.79	0.91
B3-RB (300cm)	19441.75	1.05	579.07	1.49	20.08	2.53	25.86	3.40	<LOD	NA	81.12	3.48
B3-RC (0-5cm)	32331.99	0.48	813.85	1.22	24.39	0.76	49.74	1.28	<LOD	NA	170.59	1.03
B3-RC (25cm)	31942.46	0.74	895.76	1.99	24.37	3.46	55.93	2.04	<LOD	NA	152.24	1.71
B3-RC (50cm)	29479.00	0.80	820.53	0.61	24.73	0.98	43.04	0.23	<LOD	NA	152.49	2.18
B3-RD (0-5cm)	33045.41	1.11	748.29	1.87	16.97	0.83	28.66	1.68	<LOD	NA	119.20	2.37
B3-RD (25cm)	32063.81	1.69	1280.14	0.49	30.90	0.31	54.75	0.31	<LOD	NA	182.80	1.20
B3-RD (50cm)	31484.57	0.72	928.95	1.22	24.29	1.01	37.56	1.69	<LOD	NA	143.42	1.95
B3-RE (0-5cm)	28781.76	0.25	533.81	0.76	13.37	2.08	17.68	1.61	<LOD	NA	85.27	1.43
B3-RE (25cm)	26585.52	0.46	614.30	0.72	15.09	1.93	19.46	1.35	<LOD	NA	90.11	1.68
B3-RE (50cm)	27683.64	0.36	574.05	0.74	14.23	2.01	18.57	1.48	<LOD	NA	87.69	1.55
B4-A(0-5cm)	35122.49	0.43	932.84	2.35	23.17	1.61	71.23	0.73	<LOD	NA	136.27	2.30
B4-A(25cm)	26930.31	3.21	768.01	3.41	19.42	1.77	39.22	0.78	<LOD	NA	113.04	3.15
B4-A(50cm)	21639.42	0.53	690.00	0.93	17.62	1.24	45.08	1.07	<LOD	NA	120.83	2.35
B4-A(55-65cm)	32227.26	0.50	944.38	0.94	24.80	0.68	51.61	1.72	<LOD	NA	201.46	2.17
B4-A(100cm)	25974.31	1.00	748.40	2.48	20.24	0.25	42.90	2.81	<LOD	NA	119.30	1.85
B4-A(150cm)	23502.03	0.84	619.89	1.67	17.98	0.43	32.47	2.46	<LOD	NA	105.01	2.23
B4-A(190cm)	24188.63	0.89	646.18	0.98	18.93	0.35	33.08	1.89	<LOD	NA	107.49	1.63
B4-LB(0-5cm)	29558.50	0.67	859.47	1.73	25.62	3.82	47.87	4.40	<LOD	NA	133.14	0.96
B4-LB(20-70cm)	28811.50	0.47	855.26	1.98	25.01	1.99	57.86	1.28	<LOD	NA	142.15	1.51
B4-LB(70-140cm)	33032.92	0.52	876.45	1.19	25.66	0.10	52.10	1.35	<LOD	NA	142.87	0.51
B4-LB(140-190cm)	24407.77	0.51	822.56	0.83	18.85	1.19	34.24	4.86	<LOD	NA	99.88	0.80
B4-LB(190-240cm)	25118.41	0.81	1083.54	0.53	24.43	1.48	44.49	2.11	<LOD	NA	139.42	1.57
B4-LB(240-260cm)	28084.23	1.41	945.88	0.78	26.63	0.90	53.06	1.08	<LOD	NA	146.42	0.29



**Laboratorio Nacional de Geoquímica y Minerología
Universidad Nacional Autónoma de México
Geoquímica Ambiental**



ID Campo	Al		As		Ba		Cd		Cr		Cu	
	mg/kg	RSD %	mg/kg	RSD %	mg/kg	RSD %	mg/kg	RSD %	mg/kg	RSD %	mg/kg	RSD %
B4-LC(0-5cm)	13993.70	1.84	18.06	2.70	244.34	1.98	4.40	2.70	19.97	1.17	75.95	0.65
B4-LC(25cm)	14607.75	1.06	20.19	1.40	251.57	1.15	4.80	1.40	24.42	3.28	68.32	2.42
B4-LC(50cm)	24970.03	0.49	16.23	1.62	332.23	0.52	5.51	1.62	42.27	1.64	136.09	1.67
B4-LC(100cm)	21021.35	0.55	18.77	1.71	293.60	0.51	5.47	1.71	26.21	2.63	151.20	1.33
B4-LD(0-5cm)	9662.76	1.52	23.23	0.32	216.80	1.66	4.44	0.32	17.00	4.88	77.06	4.23
B4-LD(25cm)	17984.91	2.44	15.69	1.49	259.97	2.51	5.31	1.49	24.71	1.38	86.40	1.28
B4-LD(50cm)	29930.73	1.15	18.84	2.41	347.26	1.16	5.39	2.41	20.63	1.58	57.60	1.68
B4-LE(0-5cm)	34927.26	0.43	15.33	1.64	594.77	0.42	6.67	1.64	29.92	0.54	98.42	0.80
B4-LE(25cm)	48760.26	0.88	29.12	4.65	777.90	0.97	6.06	4.65	28.22	1.12	47.06	0.69
B4-LE(50cm)	36931.27	1.02	19.90	4.23	753.67	1.15	5.43	4.23	20.33	3.83	31.02	5.93
B4-RB(0-5cm)	20517.18	1.74	25.32	1.45	297.37	1.74	5.84	1.45	21.82	1.69	102.70	1.27
B4-RB(25cm)	23526.30	1.85	20.96	8.59	270.29	1.96	6.80	3.46	24.42	0.84	170.01	3.79
B4-RB(50cm)	22260.18	0.10	18.65	1.89	272.99	0.18	5.51	1.89	27.99	0.78	112.24	1.05
B4-RB(100cm)	21008.57	1.40	16.80	2.29	254.42	1.44	4.82	2.29	18.88	0.97	121.54	1.19
B4-RB(150cm)	24346.13	1.28	19.65	2.24	247.89	1.39	5.06	2.24	19.68	2.48	95.60	1.92
B4-RC(0-5cm)	24133.42	0.72	18.39	0.66	341.46	0.81	5.37	0.66	24.45	2.06	110.67	1.12
B4-RC(25cm)	26232.08	2.88	17.38	1.60	319.92	3.01	6.77	1.60	40.79	1.32	107.70	1.03
B4-RC(50cm)	19382.23	0.80	18.97	2.54	283.66	0.90	5.53	2.54	29.21	1.68	129.16	2.42
B4-RC(100cm)	18100.15	1.70	15.42	1.19	225.64	1.79	4.62	1.19	18.00	1.89	76.62	1.60
B4-RD(0-5cm)	35460.97	1.82	18.19	2.44	414.95	1.93	5.56	2.44	28.52	2.05	91.38	1.98
B4-RD(25cm)	31188.26	1.75	12.93	2.44	362.19	1.84	5.64	2.44	26.92	2.27	65.94	2.02
B4-RD(50cm)	28644.16	0.98	13.45	1.86	352.07	0.91	6.53	1.86	24.28	2.06	57.98	3.91
B4-RE(0-5cm)	37619.92	1.65	15.57	2.95	591.10	1.68	6.82	2.95	31.79	1.61	99.89	1.76
B4-RE(25cm)	36441.38	2.36	20.23	0.43	573.80	2.45	6.13	0.43	28.98	2.10	49.64	3.44
B4-RE(50cm)	38997.01	1.99	18.28	1.84	587.10	2.10	6.79	1.84	35.04	1.08	56.18	3.19
B5-A(0-5cm)	24128.29	0.59	19.38	1.18	297.76	0.64	3.87	1.18	42.87	0.57	101.49	0.45
B5-A(10cm)	20927.86	1.43	16.40	2.42	274.02	1.61	3.50	2.42	21.89	2.17	95.15	2.49
B5-A(25cm)	16945.20	0.77	19.42	2.79	243.76	0.80	3.59	2.79	19.38	1.12	120.89	0.42
B5-A(50cm)	17433.28	1.12	16.48	1.84	240.05	1.24	3.01	1.84	20.50	1.05	83.89	0.70
B5-A(100cm)	14965.67	1.12	15.30	0.65	216.79	1.24	3.46	0.65	18.01	1.15	75.30	0.54
B5-A(150cm)	16479.60	0.54	16.97	2.33	226.29	0.60	3.60	2.33	20.39	1.33	79.81	1.25
B5-A(200cm)	15852.81	2.50	10.65	2.41	209.22	2.59	3.69	2.41	19.22	3.02	66.66	1.41
B5-A(>300cm)	27210.62	1.78	16.94	4.73	394.57	1.88	3.58	4.73	18.85	2.28	43.97	2.04



Laboratorio Nacional de Geoquímica y Minerología
Universidad Nacional Autónoma de México
Geoquímica Ambiental



ID Campo	Fe		Mn		Ni		Pb		Sb		Zn	
	mg/kg	RSD %	mg/kg	RSD %	mg/kg	RSD %	mg/kg	RSD %	mg/kg	RSD %	mg/kg	RSD %
B4-LC(0-5cm)	24737.05	0.77	686.65	2.59	19.02	1.69	39.00	3.27	<LOD	NA	119.13	0.45
B4-LC(25cm)	27313.05	0.57	822.22	0.70	21.67	1.76	61.09	0.20	<LOD	NA	123.08	2.73
B4-LC(50cm)	30534.14	0.62	843.60	1.22	43.71	0.78	50.98	0.87	<LOD	NA	134.58	1.57
B4-LC(100cm)	30708.18	0.97	850.75	1.73	24.27	1.00	52.73	1.03	<LOD	NA	132.03	1.31
B4-LD(0-5cm)	25135.50	2.43	941.15	2.59	18.14	0.80	51.36	1.67	<LOD	NA	110.46	4.51
B4-LD(25cm)	30113.27	0.22	837.89	1.49	23.86	1.29	42.23	1.43	3.83	8.35	127.95	1.58
B4-LD(50cm)	28524.00	0.71	833.19	2.21	21.88	0.57	35.25	2.10	<LOD	NA	116.89	0.47
B4-LE(0-5cm)	32779.79	0.69	842.50	0.73	22.15	0.85	36.23	1.27	<LOD	NA	155.81	0.69
B4-LE(25cm)	33941.73	0.72	711.97	0.58	25.57	2.83	21.41	1.86	<LOD	NA	122.74	7.07
B4-LE(50cm)	29223.50	0.84	796.88	0.55	25.97	2.22	19.52	5.90	<LOD	NA	107.45	3.56
B4-RB(0-5cm)	31707.70	0.37	815.09	0.87	21.43	2.06	41.00	3.04	<LOD	NA	128.61	1.14
B4-RB(25cm)	31584.89	1.35	802.52	4.38	21.73	0.58	46.28	1.79	<LOD	NA	139.54	1.15
B4-RB(50cm)	30980.05	0.57	830.12	1.21	23.64	0.88	54.57	1.62	<LOD	NA	129.83	1.12
B4-RB(100cm)	26523.12	0.96	587.70	0.45	20.06	0.73	39.12	1.52	<LOD	NA	116.20	1.32
B4-RB(150cm)	29493.31	0.45	680.29	0.94	20.35	0.71	41.73	0.52	<LOD	NA	123.01	2.64
B4-RC(0-5cm)	29073.92	0.20	902.87	1.86	23.21	1.66	56.77	1.16	<LOD	NA	151.38	1.25
B4-RC(25cm)	39605.01	0.67	843.48	1.53	25.69	1.24	51.95	1.46	<LOD	NA	140.95	0.95
B4-RC(50cm)	30596.68	0.35	773.03	1.30	21.58	1.09	45.43	1.28	<LOD	NA	120.35	2.11
B4-RC(100cm)	25928.95	0.97	681.98	0.40	19.94	0.21	34.89	2.58	<LOD	NA	109.20	1.90
B4-RD(0-5cm)	30753.81	1.21	918.84	0.88	25.96	0.34	50.53	0.67	<LOD	NA	140.86	2.00
B4-RD(25cm)	31522.46	0.51	835.31	1.42	25.68	0.70	45.19	1.35	<LOD	NA	127.84	2.23
B4-RD(50cm)	29519.70	0.81	773.48	1.43	24.19	1.58	35.36	2.57	<LOD	NA	130.62	1.30
B4-RE(0-5cm)	34570.70	1.11	1083.17	0.66	24.70	1.10	35.76	1.84	<LOD	NA	180.68	0.46
B4-RE(25cm)	32083.75	0.90	957.30	1.15	25.79	1.15	26.91	3.31	<LOD	NA	146.33	2.22
B4-RE(50cm)	36687.40	0.73	972.48	1.48	26.99	0.56	27.61	2.16	<LOD	NA	158.76	1.52
B5-A(0-5cm)	33426.12	0.78	863.83	0.27	31.68	0.83	39.62	1.63	<LOD	NA	129.98	0.59
B5-A(10cm)	30725.36	0.68	793.30	1.70	22.57	1.76	35.01	3.31	<LOD	NA	122.57	2.12
B5-A(25cm)	29860.06	0.26	732.47	0.39	21.64	0.86	30.88	0.55	<LOD	NA	125.11	0.58
B5-A(50cm)	27052.87	1.16	760.85	2.90	22.07	0.49	33.62	1.43	<LOD	NA	113.69	0.74
B5-A(100cm)	29766.95	0.86	681.68	1.41	20.31	1.34	27.14	1.12	<LOD	NA	101.85	0.83
B5-A(150cm)	31234.84	0.94	700.91	0.76	20.73	1.61	32.19	2.86	<LOD	NA	105.58	1.40
B5-A(200cm)	31433.73	0.40	637.65	1.31	19.65	0.36	23.17	4.59	<LOD	NA	102.62	1.96
B5-A(>300cm)	30751.45	2.12	449.81	0.85	22.67	1.80	21.33	6.35	<LOD	NA	102.72	2.44



Laboratorio Nacional de Geoquímica y Minerología
Universidad Nacional Autónoma de México
Geoquímica Ambiental



ID Campo	Al		As		Ba		Cd		Cr		Cu	
	mg/kg	RSD %	mg/kg	RSD %	mg/kg	RSD %	mg/kg	RSD %	mg/kg	RSD %	mg/kg	RSD %
B5-LB (0-10cm)	17664.10	1.36	15.79	1.36	243.60	1.49	5.89	1.36	30.66	1.01	86.82	2.19
B5-LB (10cm)	18466.25	0.65	16.09	1.37	252.58	0.74	7.14	1.37	42.67	0.80	131.16	3.66
B5-LB (25cm)	17966.89	1.32	12.86	2.97	226.69	1.39	5.52	26.49	23.63	62.38	55.16	56.31
B5-LB (50cm)	15371.32	1.55	11.90	1.57	202.05	1.56	6.85	1.06	38.12	2.30	87.83	1.70
B5-LB (100cm)	16993.45	2.72	9.99	1.99	248.63	2.87	5.60	1.35	26.32	1.55	62.08	0.94
B5-LB (150cm)	16093.83	1.55	10.20	2.15	209.91	1.78	6.15	4.58	27.51	0.34	57.90	0.77
B5-LB (200cm)	15316.81	1.54	8.12	2.68	211.82	1.67	6.03	2.40	28.09	0.48	62.35	0.76
B5-LB (300cm)	21778.08	1.18	11.99	1.77	250.64	1.33	5.50	0.61	25.81	0.49	55.30	0.46
B5-LB (350cm)	14634.89	1.65	11.78	1.15	185.59	1.83	4.58	2.47	18.19	2.81	49.92	1.21
B5-LC (5cm)	17026.26	1.64	13.04	1.95	268.75	1.78	5.94	0.41	28.72	3.07	88.53	1.36
B5-LC (25cm)	23325.06	2.62	14.83	1.54	300.14	2.86	5.84	0.62	23.30	1.60	135.58	1.76
B5-LC (50cm)	22910.04	2.81	15.05	1.59	308.90	2.93	5.58	2.73	26.73	2.30	130.20	1.59
B5-LD (5cm)	13678.17	1.16	12.17	1.59	212.59	1.26	9.71	2.93	70.59	0.47	74.12	0.62
B5-LD (25cm)	16033.81	1.31	11.89	0.98	248.19	1.40	5.68	1.56	27.47	1.56	63.73	0.80
B5-LD (50cm)	24115.07	0.44	13.66	0.66	509.72	0.48	5.61	1.32	26.34	1.11	94.48	0.80
B5-RB(0-5 cm)	14253.26	1.23	16.60	2.89	220.34	1.44	5.54	1.35	18.94	0.71	60.82	0.55
B5-RB(25cm)	25123.99	0.15	51.57	2.57	322.63	0.14	7.64	3.07	28.40	1.61	833.20	0.61
B5-RB(50cm)	15017.52	1.64	14.86	1.75	213.42	1.74	5.01	2.29	15.58	0.72	89.07	2.15
B5-RB(100cm)	12204.14	2.59	13.69	2.42	202.03	2.86	4.77	0.83	13.28	1.82	73.66	2.59
B5-RB(200cm)	29345.19	1.58	21.78	2.92	486.61	1.65	5.56	1.37	20.80	0.65	56.04	1.23
B5-RB(300cm)	32724.83	1.49	24.54	2.66	647.98	1.55	5.61	0.89	21.27	1.25	56.57	1.54
B5-RC(0-5cm)	24729.62	2.81	18.56	4.22	395.74	2.95	6.03	1.80	25.85	2.20	91.85	1.85
B5-RC(25cm)	28386.27	2.46	19.81	3.79	412.66	2.62	5.91	1.44	24.54	2.25	58.88	1.97
B5-RC(50cm)	17940.33	2.13	10.38	2.16	273.68	2.31	5.46	2.17	22.15	4.12	27.44	6.16
B5-RD(0-5cm)	19945.19	3.62	16.33	3.56	322.22	3.83	5.82	2.17	26.65	0.42	79.90	0.39
B5-RD(25cm)	21315.06	0.85	12.94	0.85	313.15	0.91	5.97	2.43	26.75	1.77	96.74	1.63
B5-RD(50cm)	22731.74	1.39	17.25	0.94	350.00	1.47	6.41	0.79	27.23	1.92	115.43	1.49
B5-RD'(0-5cm)	11604.48	0.88	15.65	1.98	238.01	1.02	6.71	0.66	41.89	1.08	53.42	1.06
B5-RD'(25cm)	15849.18	1.24	16.77	3.73	243.31	1.16	6.00	1.93	29.10	1.85	75.53	2.33
B5-RD'(50cm)	18918.28	1.64	17.40	0.77	329.57	1.80	5.73	1.39	22.66	4.19	137.96	3.71
B6-A(0-5cm)	18691.83	2.95	7.88	4.91	366.28	3.13	3.21	3.21	23.78	1.24	<LOD	NA
B6-LB	23202.46	0.27	8.96	2.61	293.67	0.32	3.94	2.87	19.98	1.63	17.29	3.00
B6-RB	14628.76	0.79	9.53	0.18	238.51	0.83	2.55	2.87	14.11	0.89	<LOD	NA



Laboratorio Nacional de Geoquímica y Minerología
Universidad Nacional Autónoma de México
Geoquímica Ambiental



ID Campo	Fe		Mn		Ni		Pb		Sb		Zn	
	mg/kg	RSD %	mg/kg	RSD %	mg/kg	RSD %	mg/kg	RSD %	mg/kg	RSD %	mg/kg	RSD %
B5-LB (0-10cm)	35108.85	0.64	752.82	3.16	19.97	1.33	40.85	1.86	<LOD	NA	122.55	2.02
B5-LB (10cm)	40089.52	1.27	915.26	1.54	24.97	0.71	55.14	1.11	<LOD	NA	135.93	1.51
B5-LB (25cm)	35862.91	1.56	596.49	60.50	18.51	24.09	36.48	9.06	<LOD	NA	79.56	0.97
B5-LB (50cm)	40494.65	0.76	791.65	0.84	23.13	1.25	43.53	1.50	<LOD	NA	114.82	1.90
B5-LB (100cm)	33065.51	2.92	747.14	1.55	20.49	0.78	29.87	2.23	2.23	2.77	102.34	0.89
B5-LB (150cm)	35623.75	0.86	573.27	1.94	20.42	2.47	28.81	2.54	<LOD	NA	99.24	0.56
B5-LB (200cm)	34207.00	0.83	463.88	0.82	20.90	1.76	32.25	1.59	<LOD	NA	105.57	0.21
B5-LB (300cm)	32172.97	0.61	619.91	0.61	20.80	0.55	35.11	1.16	<LOD	NA	97.53	0.32
B5-LB (350cm)	26651.32	0.53	628.87	1.50	17.32	0.96	29.59	3.33	<LOD	NA	86.47	1.75
B5-LC (5cm)	33364.59	0.98	743.29	2.23	22.69	1.04	40.48	2.95	<LOD	NA	123.85	1.49
B5-LC (25cm)	32103.45	0.54	796.63	0.83	21.86	0.04	39.21	2.86	<LOD	NA	122.00	2.04
B5-LC (50cm)	31127.39	1.37	874.15	0.57	23.68	0.56	44.44	2.30	<LOD	NA	126.44	1.65
B5-LD (5cm)	54443.76	1.46	827.85	1.21	28.95	0.59	51.39	1.73	<LOD	NA	133.67	0.37
B5-LD (25cm)	31988.06	0.48	677.74	1.56	20.45	1.39	34.48	1.39	<LOD	NA	102.57	1.05
B5-LD (50cm)	28186.28	0.61	1325.76	1.50	23.16	2.64	35.85	1.56	<LOD	NA	129.11	1.04
B5-RB(0-5 cm)	29443.24	0.17	719.18	0.82	17.49	0.80	33.89	2.53	<LOD	NA	118.23	0.60
B5-RB(25cm)	37802.96	0.90	505.14	0.54	27.08	0.94	59.22	1.20	<LOD	NA	283.97	1.52
B5-RB(50cm)	27259.59	1.11	686.83	2.19	17.39	0.75	28.98	2.42	<LOD	NA	129.54	1.68
B5-RB(100cm)	26494.93	0.76	730.65	2.12	17.30	1.33	27.88	1.82	<LOD	NA	125.09	6.83
B5-RB(200cm)	30077.13	0.46	1287.21	2.14	26.15	3.16	38.33	2.29	<LOD	NA	136.66	1.04
B5-RB(300cm)	28595.95	0.23	1919.19	2.86	25.12	0.41	36.35	0.48	<LOD	NA	138.67	1.66
B5-RC(0-5cm)	31237.61	0.35	1089.92	0.96	27.04	1.54	57.48	1.46	<LOD	NA	207.30	2.04
B5-RC(25cm)	31068.05	0.69	1122.63	0.68	30.11	1.59	52.77	0.30	<LOD	NA	150.55	1.56
B5-RC(50cm)	30229.57	0.38	787.00	0.48	22.11	1.28	29.87	3.15	<LOD	NA	110.10	4.49
B5-RD(0-5cm)	30394.14	1.01	797.69	2.04	21.75	1.48	44.28	1.18	<LOD	NA	130.86	0.47
B5-RD(25cm)	31961.93	0.43	840.38	2.58	23.41	1.18	46.41	2.83	<LOD	NA	142.66	1.58
B5-RD(50cm)	32848.34	0.34	1016.04	0.89	27.58	0.90	59.64	0.91	<LOD	NA	149.71	1.63
B5-RD'(0-5cm)	37126.29	0.54	795.98	2.54	23.87	1.20	46.76	2.30	<LOD	NA	122.36	0.88
B5-RD'(25cm)	31753.50	1.00	819.56	1.45	22.94	1.20	48.38	0.59	<LOD	NA	137.47	2.51
B5-RD'(50cm)	30529.65	0.72	944.26	0.50	24.31	0.99	51.15	0.90	<LOD	NA	153.44	3.27
B6-A(0-5cm)	23060.21	0.25	587.30	0.99	23.25	0.79	19.21	1.29	<LOD	NA	67.54	0.56
B6-LB	26882.27	0.60	607.32	0.66	22.55	0.15	20.71	5.61	<LOD	NA	85.50	1.57
B6-RB	19977.05	0.89	517.47	1.28	18.48	0.89	15.00	1.64	<LOD	NA	63.49	2.83



Laboratorio Nacional de Geoquímica y Minerología
Universidad Nacional Autónoma de México
Geoquímica Ambiental



ID Campo	Al		As		Ba		Cd		Cr		Cu	
	mg/kg	RSD %	mg/kg	RSD %	mg/kg	RSD %	mg/kg	RSD %	mg/kg	RSD %	mg/kg	RSD %
B6-RC(0-5cm)	26704.04	1.63	7.55	1.26	458.86	1.69	4.15	0.81	27.32	0.64	1.57	20.15
B6-RC(5-30cm)	19754.17	1.31	13.51	3.74	234.13	1.43	4.45	1.63	22.53	0.98	33.52	2.07
B6-RC(30-60cm)	35973.86	1.42	13.63	1.89	476.83	1.46	4.37	1.48	32.53	1.34	13.33	3.58
B6-RC(60-80cm)	23957.24	0.03	13.59	1.15	382.92	0.12	5.19	4.42	39.83	2.71	12.26	7.14
B6-RC(80-110cm)	20084.43	1.03	13.28	0.25	295.82	1.01	3.91	3.05	72.72	1.02	<LOD	NA
B6-LC(0-5cm)	27095.92	1.39	11.57	0.99	431.62	1.53	4.44	1.29	32.03	1.71	12.66	5.63
B6-LC(5-30cm)	25680.11	0.48	9.33	4.56	400.35	0.47	3.92	2.10	27.36	1.08	22.26	1.60
B6-LC(30-60cm)	19763.92	2.16	13.86	0.81	325.68	2.37	3.68	3.19	20.28	1.10	9.81	3.13
B6-LC(60-85cm)	23385.85	0.79	9.73	3.98	329.24	0.93	4.42	1.75	27.75	2.85	12.63	6.26
B6-LC(85-100cm)	18797.47	0.83	13.45	1.35	255.68	0.86	4.50	2.26	21.87	1.07	9.73	5.28
B7-A (0-5cm)	21656.89	1.60	13.06	1.32	328.43	1.72	3.40	4.66	20.02	1.70	46.56	0.48
B7-LB (0-5cm)	17791.65	0.47	12.58	0.58	224.23	0.51	3.37	4.09	20.30	1.64	48.16	1.71
B7-LC (0-5cm)	20085.49	2.41	12.22	2.58	306.80	2.47	3.99	1.01	58.53	2.62	46.86	2.92
B7-LC (25cm)	25235.87	1.21	11.10	2.35	376.91	1.30	5.01	0.99	39.82	2.41	66.07	2.10
B7-LC (50cm)	18495.21	0.37	10.06	1.15	297.90	0.36	5.74	0.60	47.90	0.29	61.02	0.66
B7-LC (100cm)	37785.17	1.04	18.85	2.68	469.93	1.14	5.50	0.98	46.09	1.55	108.19	1.10
B7-LD (0-5cm)	48923.28	0.49	10.58	3.41	334.41	0.57	6.85	2.83	70.32	0.80	45.24	0.82
B7-LD (30cm)	75911.78	1.24	17.00	1.55	317.38	1.24	5.73	6.02	36.02	3.24	44.50	3.80
B7-RB (0-5cm)	19657.80	0.88	14.45	1.36	293.95	0.99	3.80	1.43	20.99	1.50	50.07	1.39
B7-RC (0-5cm)	34266.32	1.15	9.12	0.86	327.42	1.17	4.39	2.35	27.54	0.61	53.21	0.54
B7-RC (25cm)	40220.12	1.88	8.27	0.99	317.81	2.01	5.00	0.89	31.59	3.59	35.50	3.66
B7-RC (50cm)	43924.54	0.76	7.25	1.60	335.78	0.80	5.36	2.47	36.95	0.67	43.82	1.38
B8-A (0-5cm)	16780.22	2.21	19.73	0.88	303.52	2.32	4.10	3.74	16.40	2.31	36.80	1.67
B8-LB (0-5cm)	22094.66	0.90	12.98	1.87	406.69	1.73	3.94	3.07	15.30	1.68	36.15	1.46
B8-LC (0-5cm)	21773.67	1.65	9.32	2.57	326.12	1.71	5.28	4.25	46.91	1.00	13.00	1.88
B8-LC (5-25cm)	22860.45	1.76	5.02	1.44	333.19	1.89	5.71	4.93	51.12	2.22	14.03	6.83
B8-LC (25-50cm)	21596.91	1.07	5.19	1.02	312.59	1.11	6.51	4.82	62.28	0.94	16.96	2.35
B8-LC (50-75cm)	21746.10	2.05	8.65	1.70	319.70	2.15	4.44	2.29	32.80	1.26	4.82	8.67
B8-LC (+75cm)	29234.96	1.47	9.37	5.54	371.49	1.54	4.19	1.20	23.57	1.98	0.93	41.19
B8-RB (0-5cm)	19690.30	1.11	10.64	5.52	298.18	1.24	5.52	0.98	43.07	1.61	39.20	2.43
B8-RC (0-5cm)	20129.60	1.41	10.38	2.54	305.87	1.44	5.91	2.23	40.39	1.44	37.62	0.69
B8-RC (5-25cm)	21474.25	0.94	10.01	1.34	619.48	0.97	6.53	0.54	44.76	1.62	38.73	1.37
B8-RC (25-50cm)	22895.54	0.43	6.87	1.44	399.95	0.42	7.03	1.12	50.73	1.35	26.01	1.28
B8-RC (+50cm)	32692.02	1.99	36.09	2.83	214.54	2.11	6.70	4.25	10.25	4.63	37.88	2.19



Laboratorio Nacional de Geoquímica y Minerología
Universidad Nacional Autónoma de México
Geoquímica Ambiental



ID Campo	Fe		Mn		Ni		Pb		Sb		Zn	
	mg/kg	RSD %	mg/kg	RSD %	mg/kg	RSD %	mg/kg	RSD %	mg/kg	RSD %	mg/kg	RSD %
B6-RC(0-5cm)	28873.48	1.45	690.99	1.27	24.77	0.69	19.70	0.46	<LOD	NA	87.94	0.69
B6-RC(5-30cm)	31399.26	0.45	598.31	0.50	21.12	1.16	39.82	1.52	<LOD	NA	99.62	1.19
B6-RC(30-60cm)	30324.33	0.69	794.64	1.40	27.75	1.11	24.13	0.91	<LOD	NA	100.09	0.81
B6-RC(60-80cm)	38925.44	0.61	599.95	0.87	27.17	1.72	21.68	1.17	<LOD	NA	105.53	2.27
B6-RC(80-110cm)	29834.45	0.34	646.88	2.24	43.58	0.34	20.48	2.68	<LOD	NA	78.00	1.49
B6-LC(0-5cm)	31836.35	1.75	769.37	0.39	24.74	1.11	25.61	3.30	<LOD	NA	95.84	2.08
B6-LC(5-30cm)	27884.03	0.52	707.05	1.31	26.14	0.69	30.38	1.82	<LOD	NA	91.40	0.85
B6-LC(30-60cm)	27413.24	0.70	617.84	1.79	22.51	1.35	67.15	0.68	<LOD	NA	83.88	0.97
B6-LC(60-85cm)	31511.06	1.00	669.09	1.17	24.80	0.72	26.36	2.84	<LOD	NA	89.66	2.81
B6-LC(85-100cm)	33082.19	0.64	605.88	0.62	21.79	0.58	24.58	1.35	<LOD	NA	99.43	1.47
B7-A (0-5cm)	27249.01	0.50	534.28	0.56	30.31	0.42	15.42	1.57	<LOD	NA	85.01	0.83
B7-LB (0-5cm)	27496.18	1.12	475.72	0.82	29.09	0.50	13.71	5.90	<LOD	NA	83.36	1.63
B7-LC (0-5cm)	31889.13	0.34	531.28	1.23	47.72	1.08	20.86	1.15	<LOD	NA	94.55	2.30
B7-LC (25cm)	34331.11	0.22	593.59	1.24	34.75	1.67	23.11	4.93	<LOD	NA	106.58	2.00
B7-LC (50cm)	40416.79	0.59	568.87	0.58	34.71	1.05	22.78	3.52	<LOD	NA	108.07	0.25
B7-LC (100cm)	37880.54	0.24	916.38	2.16	51.00	1.16	30.29	3.14	<LOD	NA	139.73	1.54
B7-LD (0-5cm)	52085.20	0.71	837.89	0.89	50.63	0.70	16.32	6.42	<LOD	NA	117.40	1.05
B7-LD (30cm)	45736.87	0.99	792.83	0.96	49.67	0.96	13.36	7.15	<LOD	NA	104.02	3.56
B7-RB (0-5cm)	28338.07	0.05	551.59	0.87	31.21	0.74	14.20	6.96	<LOD	NA	88.78	1.64
B7-RC (0-5cm)	31365.17	0.49	816.12	1.42	36.33	1.39	17.64	5.19	<LOD	NA	113.86	0.72
B7-RC (25cm)	35943.59	0.07	833.01	1.37	46.55	0.57	12.15	8.56	<LOD	NA	96.46	2.82
B7-RC (50cm)	38484.40	0.13	897.76	1.57	51.52	0.67	13.08	7.62	<LOD	NA	109.33	0.76
B8-A (0-5cm)	24099.37	0.86	441.37	1.26	26.43	1.24	10.14	1.43	<LOD	NA	74.71	1.34
B8-LB (0-5cm)	23653.52	0.49	438.05	1.15	25.63	0.84	8.60	5.56	<LOD	NA	75.31	1.20
B8-LC (0-5cm)	38877.29	0.43	634.10	0.94	33.42	1.28	19.37	7.19	<LOD	NA	98.58	0.88
B8-LC (5-25cm)	41460.24	0.31	605.08	0.43	33.96	0.82	18.30	7.84	<LOD	NA	105.81	2.18
B8-LC (25-50cm)	47024.25	0.32	537.12	1.23	37.73	0.53	22.09	1.92	<LOD	NA	106.08	0.42
B8-LC (50-75cm)	32404.44	0.23	454.17	1.48	31.37	1.81	14.62	3.96	<LOD	NA	77.72	1.67
B8-LC (+75cm)	31123.21	0.46	559.87	1.89	23.50	0.42	14.85	3.38	<LOD	NA	84.58	1.44
B8-RB (0-5cm)	31637.28	1.45	500.60	0.68	39.28	1.08	14.50	2.98	<LOD	NA	89.85	1.95
B8-RC (0-5cm)	33793.25	1.56	518.79	1.63	30.55	1.10	19.76	2.95	<LOD	NA	93.62	1.25
B8-RC (5-25cm)	36414.70	0.31	553.77	1.08	32.38	0.33	45.05	0.81	<LOD	NA	100.67	1.54
B8-RC (25-50cm)	38942.74	0.09	977.73	1.19	32.50	0.92	28.94	2.98	<LOD	NA	99.37	2.12
B8-RC (+50cm)	38814.61	0.94	3153.48	2.33	16.25	1.37	10.36	4.03	<LOD	NA	107.72	2.05



CONTROL DE CALIDAD

En el caso de los análisis determinados por ICP-OES la concentración de cada elemento fue determinada por triplicado, el valor reportado es el promedio de las tres determinaciones reportando también la desviación estándar relativa (RSD) de las mediciones.

Para determinar la exactitud se utilizaron estándares de control analítico de concentraciones conocidas (5 y 50 ppm) los cuales fueron analizados como muestra para determinar su concentración por medio de curvas de calibración preparadas, indicando un buen desempeño del método de análisis.

% exactitud	Al	As	Ba	Cd	Cr	Cu	Fe	Mn	Ni	Pb	Sb	Zn
50 ppm	103.92	100.18	104.66	97.99	100.09	103.57	101.56	100.29	98.71	101.64	101.04	98.08
5 ppm	105.72	109.72	109.11	111.79	105.09	103.23	105.52	107.18	104.28	106.00	109.03	108.36

Sin mas por al momento quedo a sus ordenes.

Analistas:

QFB. Fabiola Vega García

QA Daniel Ramos Pérez

M en C Alicia Santana Silva

Responsable tecnico:

M en C Luis Gerardo Martínez Jardines



INFORME DE RESULTADOS ICP-OES
SONORA

Datos del solicitante:

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Información de las muestras:

Fecha de recepción de muestras: 13 de julio del 2015

Se analizaron 222 muestras de suelos del Molinito.
 Las muestras se recibieron en bolsas de plástico de 25X10 cm.

Información de los análisis

En las 222 muestras se determinaron elementos traza por Espectrometría de Emisión Óptica con Plasma Inductivamente Acoplado (ICP-OES) en un equipo Pekín Elmer serie 8300.

Las muestras fueron digeridas por el método EPA 3051, los resultados se reportan en mg/kg.

Modo de inyección : Camara ciclónica.

Límites de detección :

Los límites considerados son para modo de inyección cámara ciclónica y están reportados en mg/l.

LD mg/L	Al	As	Ba	Cd	Cr	Cu	Fe	Mn	Ni	Pb	Sb	Zn
	0.08	0.07	0.01	0.02	0.003	0.122	0.01	0.007	0.01	0.03	0.1	0.007

Lista de muestras:

ID Campo	coordenadas		ID Campo	coordenadas		ID Campo	coordenadas	
	X	Y		X	Y		X	Y
S1-A (0-5cm)	579052	3354518	S1-RB'(25cm)	579036	3354531	S2-LB (25cm)	573772	3340394
S1-LB (0-5cm)	579053	3354516	S1-RB'(50cm)	579036	3354531	S2-LC (0-5cm)	573770	3340395
S1-LC (5cm)	579057	3354515	S1-RC (0-5cm)	579065	3354603	S2-LC (25cm)	573770	3340395
S1-LC (25cm)	579057	3354515	S1-RC (25cm)	579065	3354603	S2-LC (50cm)	573770	3340395
S1-LD(5cm)	579080	3354497	S1-RC roca	579065	3355603	S2-LC roca	573770	3340395
S1-LD(25cm)	579080	3354497	S1-RD (0-5cm)	579043	3354612	S2-LD (0-5cm)	573645	3340377
S1-LD (50cm)	579080	3354497	S1-RE (0-5cm)	579030	3354644	S2-LD roca	573645	3340377
S1-RB (0-5cm)	579048	3354521	S2-A (0-5cm)	573791	3340390	S2-LE(0-5cm)	573743	3340447
S1-RB'(0-5cm)	579036	3354531	S2-LB (0-5cm)	573772	3340394	S2-LE roca	573743	3340447



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Geoquímica Ambiental



ID Campo	coordenadas		ID Campo	coordenadas		ID Campo	coordenadas	
	X	Y		X	Y		X	Y
S2-RB (0-5cm)	573814	3340383	S4-LC(50cm)	579850	3287988	S6-LC(0-5cm)	572111	3260849
S2-RC (0-5cm)	573387	3340376	S4-LD(0-5cm)	579738	3288158	S6-LC(25cm)	572111	3260849
S2-RC (25cm)	573387	3340376	S4-LD(25cm)	579738	3288158	S6-LC(50cm)	572111	3260849
S2-RC (50cm)	573387	3340376	S4-LD(50cm)	579738	3288158	S6-LC(70cm)	572111	3260849
S2-RD (0-5cm)	573852	3340354	S4-RB(0-5cm)	579888	3288161	S6-LD(0-5cm)	572116	3260872
S2-RD (25cm)	573852	3340354	S4-RB(30cm)	579888	3288161	S6-LD(25cm)	572116	3260872
S2-RD (50cm)	573852	3340354	S4-RC(0-5cm)	580090	3288241	S6-LD(50cm)	572116	3260872
S2-RE (0-5cm)	573913	3340335	S4-RC(25cm)	580090	3288241	S6-LE(0-5cm)	572113	3260879
S2-RE (25cm)	573913	3340335	S4-RC(50cm)	580090	3288241	S6-LE(Roca)	572113	3260879
S2-RE (50cm)	573913	3340335	S4-RD(0-5cm)	580277	3288292	S6-RB(0-5cm)	572101	3260812
S3-A (0-5cm)	575540	3324301	S4-RD(25cm)	580277	3288292	S6-RB(25cm)	572101	3260812
S3-LB (0-5cm)	575528	3324320	S4-RD(50cm)	580277	3288292	S6-RB(50cm)	572101	3260812
S3-LB (25cm)	575528	3324320	S5-RC(0-5cm)	584650	3266888	S6-RB(80cm)	572101	3260812
S3-LC (0-5cm)	575468	3324300	S5-A (0-5cm)	584637	3266909	S6-RC(0-5cm)	572089	3260788
S3-LC (25cm)	575468	3324300	S5-LB (0-5cm)	584611	3266912	S6-RC(25cm)	572089	3260788
S3-LC (50cm)	575468	3324300	S5-LB (25cm)	584611	3266912	S6-RC(50cm)	572089	3260788
S3-LD (0-5cm)	575309	3324207	S5-LC (0-5cm)	584563	3266947	S6-RC(100cm)	572089	3260788
S3-LD (25cm)	575309	3324207	S5-LC (25cm)	584563	3266947	S6-RD(0-5cm)	572093	3260755
S3-LD (50cm)	575309	3324207	S5-LC (50cm)	584563	3266947	S6-RD(25cm)	572093	3260755
S3-LE (0-5cm)	574330	3324346	S5-LD (0-5cm)	584571	3267008	S6-RD(50cm)	572093	3260755
S3-LE (25cm)	574330	3324346	S5-LD (25cm)	584571	3267008	S7-A (0-5cm)	557248	3255589
S3-LE (50cm)	574330	3324346	S5-LD (50cm)	584571	3267008	S7-A (5-25cm)	557248	3255589
S3-RB (0-5cm)	575546	3324319	S5-LE (0-5cm)	584550	3267094	S7-A (25-50cm)	557248	3255589
S3-RB (25cm)	575546	3324319	S5-LE (25cm)	584550	3267094	S7-A (50-100cm)	557248	3255589
S3-RC (0-5cm)	575544	3324318	S5-LE(50cm)	584550	3267094	S7-A (100-150cm)	557248	3255589
S3-RC (25cm)	575544	3324318	S5-LE roca	584550	3267094	S7-A (150-200cm)	557248	3255589
S3-RC (50cm)	575544	3324318	S5-RB (0-5cm)	584644	3266902	S7-A (200-250cm)	557248	3255589
S3-RD (0-5cm)	575548	3324324	S5-RB (25cm)	584644	3266902	S7-A (250-290cm)	557248	3255589
S3-RD (25cm)	575548	3324324	S5-RC roca	584650	3266888	S7-A (+290cm)	557248	3255589
S3-RD (50cm)	575548	3324324	S5-RD (0-5cm)	584590	3266876	S7-LB (0-5cm)	557241	3255627
S4-LB(0-5cm)	579883	3288160	S5-RD roca	584590	3266876	S7-LB (5-25cm)	557241	3255627
S4-LB(25cm)	579883	3288160	S6-LB(0-5cm)	572106	3260832	S7-LB (25-50cm)	557241	3255627
S4-LB(40cm)	579883	3288160	S6-LB(25cm)	572106	3260832	S7-LB (50-100cm)	557241	3255627
S4-LC(0-5cm)	579850	3287988	S6-LB(50cm)	572106	3260832	S7-LB (100-150cm)	557241	3255627
S4-LC(25cm)	579850	3287988	S6-LB(100cm)	572106	3260832	S7-LB (150-200cm)	557241	3255627



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Geoquímica Ambiental



ID Campo	coordenadas		ID Campo	coordenadas		ID Campo	coordenadas	
	X	Y		X	Y		X	Y
S7-LB (200-250cm)	557241	3255627	S8-LC(25cm)	544504	3243667	S9-LB (150-200cm)	535163	3236312
S7-LB (250-300cm)	557241	3255627	S8-LC(50cm)	544504	3243667	S9-LB (200-250cm)	535163	3236312
S7-LB (+300cm)	557241	3255627	S8-LC(100cm)	544504	3243667	S9-LB (250-300cm)	535163	3236312
S7-LC (0-5cm)	557238	3255640	S8-LC(150cm)	544504	3243667	S9-LC (0-5cm)	535161	3236322
S7-LC (5-25cm)	557238	3255640	S8-LD(0-5cm)	544479	3243742	S9-LC (5-25cm)	535161	3236322
S7-LC (25-50cm)	557238	3255640	S8-LD(25cm)	544479	3243742	S9-LC (25-50cm)	535161	3236322
S7-LC (50-100cm)	557238	3255640	S8-LD(50cm)	544479	3243742	S9-LC (50-100cm)	535161	3236322
S7-LC (100-150cm)	557238	3255640	S8-LD(100cm)	544479	3243742	S9-LC (100-150cm)	535161	3236322
S7-LC (+150cm)	557238	3255640	S8-LD(120cm)	544479	3243742	S9-LC (150-200cm)	535161	3236322
S7-RB (0-5cm)	557257	3255557	S8-RB (0-5cm)	544527	3243627	S9-LD (0-5cm)	535151	3236383
S7-RB (5-25cm)	557257	3255557	S8-RB (5-30cm)	544527	3243627	S9-LD (5-25cm)	535151	3236383
S7-RB (25-50cm)	557257	3255557	S8-RB (30-45cm)	544527	3243627	S9-LD (25-50cm)	535151	3236383
S7-RB (50-100cm)	557257	3255557	S8-RB (45-70cm)	544527	3243627	S9-LD (50-100cm)	535151	3236383
S7-RB (100-150cm)	557257	3255557	S8-RC (0-5cm)	544531	3243614	S9-RB (0-5cm)	535174	3236228
S7-RB (150-200cm)	557257	3255557	S8-RC (5-25cm)	544531	3243614	S9-RB (5-25cm)	535174	3236228
S7-RB (200-250cm)	557257	3255557	S8-RC (25-50cm)	544531	3243614	S9-RB (25-50cm)	535174	3236228
S7-RB (250-300cm)	557257	3255557	S8-RC (50-100cm)	544531	3243614	S9-RB (50-100cm)	535174	3236228
S7-RB (300-350cm)	557257	3255557	S8-RC (+100cm)	544531	3243614	S9-RB (100-150cm)	535174	3236228
S7-RB (+350cm)	557257	3255557	S9-A (0-5cm)	535169	3236270	S9-RB (150-200cm)	535174	3236228
S7-RC (0-5cm)	557261	3255549	S9-A (5-25cm)	535169	3236270	S9-RB (200-260cm)	535174	3236228
S7-RC (5-25cm)	557261	3255549	S9-A (25-50cm)	535169	3236270	S9-RC (0-5cm)	535176	3236220
S7-RC (25-50cm)	557261	3255549	S9-A (50-100cm)	535169	3236270	S9-RC (5-25cm)	535176	3236220
S7-RC (50-100cm)	557261	3255549	S9-A (100-150cm)	535169	3236270	S9-RC (25-50cm)	535176	3236220
S7-RC (100-150cm)	557261	3255549	S9-A (150-200cm)	535169	3236270	S9-RC (50-100cm)	535176	3236220
S7-RC (+150cm)	557261	3255549	S9-A (200-250cm)	535169	3236270	S9-RC (100-150cm)	535176	3236220
S8-A (0-5cm)	544516	3243647	S9-LB (0-5cm)	535163	3236312	S9-RC (150-200cm)	535176	3236220
S8-LB(0-5cm)	544508	3243652	S9-LB (5-25cm)	535163	3236312	S9-RD (0-5cm)	535190	3236160
S8-LB(25cm)	544508	3243652	S9-LB (25-50cm)	535163	3236312	S9-RD (5-25cm)	535190	3236160
S8-LB(40cm)	544508	3243652	S9-LB (50-100cm)	535163	3236312	S9-RD (25-50cm)	535190	3236160
S8-LC(0-5cm)	544504	3243667	S9-LB (100-150cm)	535163	3236312	S9-RD (50-100cm)	535190	3236160



Resultados:

ID Campo	Al		As		Ba		Cd		Cr		Cu	
	mg/kg	RSD %	mg/kg	RSD %	mg/kg	RSD %	mg/kg	RSD %	mg/kg	RSD %	mg/kg	RSD %
S1-A (0-5cm)	13787.06	1.78	9.36	1.96	191.04	1.83	3.42	0.81	15.68	1.56	50.60	2.75
S1-LB (0-5cm)	17191.50	0.15	11.07	7.17	190.19	0.25	3.08	3.14	13.76	3.03	36.74	1.72
S1-LC (5cm)	26940.09	0.22	24.45	1.42	322.10	0.18	4.81	1.07	21.62	2.03	30.04	1.63
S1-LC (25cm)	24593.37	0.57	25.70	7.78	304.22	0.62	4.52	3.41	21.36	1.80	30.77	1.17
S1-LD(5cm)	24777.56	0.77	41.23	2.79	364.39	0.86	5.36	1.38	22.41	0.88	32.72	1.49
S1-LD(25cm)	28487.11	1.33	26.63	4.36	391.18	1.46	5.21	1.78	25.94	3.48	54.47	3.28
S1-LD (50cm)	25167.16	1.60	45.47	2.57	388.52	1.68	6.05	1.72	26.91	0.64	36.25	0.20
S1-RB (0-5cm)	12620.55	0.78	10.68	3.17	184.37	0.67	2.97	1.22	13.82	1.02	33.01	1.29
S1-RB'(0-5cm)	15043.92	0.91	11.55	1.21	203.61	0.91	3.21	2.38	13.51	1.76	33.63	0.59
S1-RB'(25cm)	14774.86	0.85	10.85	1.30	187.42	0.97	3.13	0.51	13.07	3.51	38.75	1.57
S1-RB'(50cm)	15177.06	0.52	10.27	2.07	198.61	0.69	3.51	2.85	29.63	1.46	40.73	2.19
S1-RC (0-5cm)	16441.22	1.14	9.83	3.28	245.67	1.15	4.16	1.27	29.73	1.91	38.74	1.45
S1-RC (25cm)	18999.93	2.29	13.70	9.64	242.17	2.59	4.49	1.22	26.10	0.90	41.78	0.49
S1-RC roca	10995.74	2.23	8.39	3.77	119.67	2.58	4.03	1.88	34.82	2.09	21.90	2.80
S1-RD (0-5cm)	32454.80	1.66	32.52	3.12	289.73	1.81	7.76	3.00	54.78	2.89	31.47	2.36
S1-RE (0-5cm)	31680.85	1.27	9.64	5.82	288.62	1.35	6.05	3.63	52.35	1.55	55.90	1.34
S2-A (0-5cm)	13844.74	2.25	9.24	4.21	217.37	2.47	4.24	3.89	20.15	0.58	22.64	1.21
S2-LB (0-5cm)	12585.36	1.89	11.85	2.72	171.83	2.12	3.05	1.93	13.26	0.15	27.22	0.63
S2-LB (25cm)	12058.36	0.83	12.90	2.76	186.94	0.81	4.03	1.95	20.11	1.44	25.99	0.74
S2-LC (0-5cm)	19385.75	1.56	126.56	2.57	349.67	1.69	5.21	3.21	20.64	2.55	42.86	1.28
S2-LC (25cm)	25356.48	0.83	37.27	1.13	350.65	0.91	4.36	0.73	23.71	0.72	42.00	0.65
S2-LC (50cm)	20857.46	1.24	68.52	2.84	316.08	1.25	4.10	0.37	19.10	1.28	46.52	2.30
S2-LC roca	10572.12	1.40	224.04	1.37	343.25	1.55	4.03	1.92	2.35	5.01	18.56	2.56
S2-LD (0-5cm)	17125.48	1.52	407.53	0.55	102.70	1.56	4.63	1.70	3.39	3.23	19.87	1.09
S2-LD roca	18144.67	0.18	215.80	1.12	70.76	0.26	1.94	0.89	0.46	8.25	13.27	3.07
S2-LE(0-5cm)	42431.26	2.07	73.39	2.09	387.64	2.22	5.91	1.57	22.56	0.88	31.94	1.59
S2-LE roca	6517.33	1.76	352.34	0.89	115.16	1.86	5.22	4.16	0.70	9.10	16.05	0.91
S2-RB (0-5cm)	14681.95	1.09	13.91	2.14	209.16	1.06	2.99	1.95	13.48	1.27	24.62	0.97
S2-RC (0-5cm)	16391.41	2.00	11.97	2.28	197.61	2.12	4.06	1.31	20.45	1.85	29.21	2.35
S2-RC (25cm)	14865.48	1.00	14.45	2.16	208.01	1.03	3.23	1.19	16.89	0.72	24.30	0.98
S2-RC (50cm)	26779.86	3.49	16.90	7.45	330.80	3.70	4.27	1.05	23.66	0.89	47.48	0.50



ID Campo	Fe		Mn		Ni		Pb		Sb		Zn	
	mg/kg	RSD %	mg/kg	RSD %	mg/kg	RSD %	mg/kg	RSD %	mg/kg	RSD %	mg/kg	RSD %
S1-A (0-5cm)	25282.30	0.73	505.93	0.65	18.13	2.00	14.67	2.44	3.26	1.63	82.62	1.89
S1-LB (0-5cm)	22742.66	0.52	485.83	1.07	17.23	0.25	13.92	2.95	0.16	1.25	94.21	1.73
S1-LC (5cm)	29073.51	1.02	584.60	0.44	19.63	1.10	41.87	1.86	2.42	1.16	180.38	1.51
S1-LC (25cm)	26890.25	0.85	754.05	2.16	23.09	1.69	41.64	1.40	1.62	0.85	166.48	1.72
S1-LD(5cm)	30856.35	0.26	621.15	1.60	19.61	1.18	87.04	1.39	7.34	1.35	245.32	0.80
S1-LD(25cm)	32257.70	0.92	728.60	0.33	23.60	1.82	61.01	0.33	5.55	1.80	185.42	2.93
S1-LD (50cm)	33467.48	0.65	731.71	1.48	23.40	1.23	106.96	0.62	4.52	1.51	238.60	0.51
S1-RB (0-5cm)	22086.56	0.18	428.41	1.97	15.78	0.55	13.52	3.60	1.08	2.23	73.31	1.03
S1-RB'(0-5cm)	23366.43	0.76	492.56	1.30	17.55	0.95	18.26	3.41	0.92	1.22	73.98	0.39
S1-RB'(25cm)	22629.28	0.93	497.58	0.84	17.72	1.25	15.14	1.96	1.01	2.64	77.12	1.67
S1-RB'(50cm)	25802.39	0.15	533.95	0.52	30.49	0.78	15.42	5.18	0.59	2.03	77.67	2.29
S1-RC (0-5cm)	28833.69	0.65	497.52	1.11	23.72	0.90	17.16	6.36	2.02	1.25	90.98	2.19
S1-RC (25cm)	30790.74	0.72	562.84	2.29	24.13	2.38	34.75	0.31	2.38	1.11	91.23	0.64
S1-RC roca	22975.61	0.47	578.65	1.23	34.45	1.15	23.31	7.05	5.87	0.85	65.23	2.22
S1-RD (0-5cm)	53068.43	0.79	659.74	2.56	47.45	0.37	13.14	2.68	7.76	0.81	117.40	2.62
S1-RE (0-5cm)	38331.03	0.36	865.13	1.03	30.90	1.41	29.84	2.47	3.90	1.94	177.99	1.41
S2-A (0-5cm)	29168.35	0.74	460.97	1.74	18.63	1.40	17.09	1.72	0.69	1.25	77.83	1.31
S2-LB (0-5cm)	21416.99	0.58	377.59	1.12	15.62	1.15	13.84	5.91	3.14	1.31	67.11	0.82
S2-LB (25cm)	28303.43	0.63	455.57	0.70	20.16	0.64	16.95	5.53	<LOD	NA	73.41	1.27
S2-LC (0-5cm)	35156.59	1.67	791.48	1.91	20.17	2.44	562.27	1.33	23.29	1.83	224.11	1.78
S2-LC (25cm)	28692.50	1.06	617.68	0.52	24.57	0.36	100.15	0.69	2.19	1.92	102.38	1.27
S2-LC (50cm)	26703.10	0.80	747.06	1.48	23.45	1.65	268.12	1.96	0.68	1.59	133.03	2.02
S2-LC roca	31061.93	0.73	521.18	0.78	5.34	3.78	901.81	1.68	64.23	0.87	229.76	1.93
S2-LD (0-5cm)	33287.57	1.81	172.11	0.65	5.67	2.37	1015.75	2.21	54.87	2.08	180.97	1.75
S2-LD roca	14500.55	1.87	68.96	3.44	3.26	3.60	1174.33	3.54	20.35	2.86	94.33	3.14
S2-LE(0-5cm)	34535.73	0.81	1451.54	0.78	23.03	0.87	478.45	1.81	17.72	2.65	296.79	1.66
S2-LE roca	40098.92	0.44	115.11	0.97	5.95	3.14	479.16	2.31	100.70	1.01	205.81	1.80
S2-RB (0-5cm)	21655.36	0.56	391.59	0.86	16.23	1.63	16.25	1.96	2.04	2.16	70.31	1.25
S2-RC (0-5cm)	27776.47	0.66	557.83	1.60	19.22	2.67	21.38	0.58	<LOD	NA	88.11	2.21
S2-RC (25cm)	23460.55	0.61	504.23	2.96	17.60	1.19	18.93	2.46	<LOD	NA	75.51	0.73
S2-RC (50cm)	29058.12	0.91	682.58	1.16	23.90	0.65	27.46	2.98	2.39	1.38	99.89	0.37



Laboratorio Nacional de Geoquímica y Minerología
Universidad Nacional Autónoma de México
Geoquímica Ambiental



ID Campo	Al		As		Ba		Cd		Cr		Cu	
	mg/kg	RSD %	mg/kg	RSD %	mg/kg	RSD %	mg/kg	RSD %	mg/kg	RSD %	mg/kg	RSD %
S2-RD (0-5cm)	15974.05	1.09	13.55	10.08	267.79	1.19	3.83	2.60	20.28	2.54	40.03	2.00
S2-RD (25cm)	29756.44	1.36	19.30	6.15	344.46	1.44	4.50	2.79	23.65	3.20	57.83	3.07
S2-RD (50cm)	25025.40	2.48	15.81	2.24	322.79	2.60	4.15	1.30	25.19	0.26	49.83	1.08
S2-RE (0-5cm)	21931.09	4.07	24.56	3.81	330.65	4.42	4.72	2.68	23.90	0.82	50.46	0.51
S2-RE (25cm)	18933.00	1.39	18.27	2.13	290.06	1.48	4.35	1.38	25.24	1.88	39.06	2.01
S2-RE (50cm)	20836.57	2.48	16.89	1.49	320.95	2.69	4.48	0.45	24.44	1.37	43.75	1.54
S3-A (0-5cm)	15357.41	2.22	13.24	5.99	188.91	2.27	2.90	1.58	9.25	4.04	14.50	3.02
S3-LB (0-5cm)	16182.75	3.40	11.53	3.95	219.55	3.50	3.03	2.29	11.29	4.64	19.25	6.09
S3-LB (25cm)	13927.68	2.63	13.14	5.90	178.23	2.68	2.96	1.63	9.35	4.03	16.95	3.51
S3-LC (0-5cm)	17802.14	2.48	10.67	5.78	244.86	2.57	3.59	4.69	20.39	2.07	19.72	2.46
S3-LC (25cm)	18138.56	0.96	12.72	5.96	220.83	1.00	3.64	2.49	17.50	2.50	16.86	2.60
S3-LC (50cm)	16563.42	2.62	11.59	2.38	226.09	2.63	3.05	4.40	12.42	0.13	15.08	0.84
S3-LD (0-5cm)	24441.11	2.08	12.81	5.53	296.98	2.09	4.05	3.49	26.11	0.71	27.12	1.08
S3-LD (25cm)	24976.15	1.08	16.02	2.85	237.87	1.11	4.27	1.84	22.82	2.24	23.12	1.76
S3-LD (50cm)	16351.78	1.99	12.80	10.61	198.24	2.01	4.00	3.20	21.62	1.46	20.00	2.58
S3-LE (0-5cm)	19478.86	3.20	<LOD	NA	119.61	3.44	2.39	1.33	10.77	3.59	11.94	4.11
S3-LE (25cm)	20995.61	2.75	<LOD	NA	119.25	2.79	2.48	2.28	11.71	4.04	5.03	8.05
S3-LE (50cm)	31080.56	3.92	<LOD	NA	153.36	3.99	3.19	6.45	19.48	3.52	7.15	3.20
S3-RB (0-5cm)	15654.93	2.96	12.28	11.52	174.60	2.98	3.26	3.21	12.01	4.23	18.85	4.49
S3-RB (25cm)	12812.71	0.46	11.66	6.85	137.15	0.44	2.80	0.84	8.71	0.80	12.30	1.72
S3-RC (0-5cm)	33299.83	4.11	8.94	12.92	249.83	4.18	3.51	3.84	15.73	2.10	22.51	3.00
S3-RC (25cm)	25759.95	2.34	11.03	1.67	295.44	2.37	5.72	2.90	38.70	4.63	34.91	5.83
S3-RC (50cm)	31919.50	3.53	13.40	7.66	331.89	3.78	5.22	3.57	30.91	0.60	36.99	0.50
S3-RD (0-5cm)	29173.43	3.62	6.58	2.05	182.05	3.75	3.59	1.56	14.73	1.89	20.96	2.32
S3-RD (25cm)	30907.05	1.47	6.56	7.76	175.54	1.56	3.95	1.81	18.28	1.93	20.97	0.75
S3-RD (50cm)	39877.50	2.71	6.55	2.02	251.00	2.91	4.24	1.98	22.34	3.97	26.32	4.38
S4-LB(0-5cm)	13015.17	3.14	12.39	0.88	160.29	0.22	3.64	1.27	22.21	2.03	16.04	1.60
S4-LB(25cm)	12989.72	2.19	23.98	5.91	133.10	0.25	2.97	1.51	26.28	1.72	33.70	0.85
S4-LB(40cm)	10874.70	1.74	15.93	12.20	125.24	0.93	2.29	0.75	10.43	1.13	26.71	0.93
S4-LC(0-5cm)	24442.96	2.72	18.02	5.65	252.69	0.82	3.86	2.07	25.07	0.56	30.75	3.08
S4-LC(25cm)	20020.18	0.95	19.10	4.28	227.32	0.69	4.40	1.33	30.14	1.03	22.66	5.85
S4-LC(50cm)	25318.50	0.86	20.30	5.08	279.76	0.70	4.56	2.73	39.11	1.78	40.42	1.83
S4-LD(0-5cm)	13723.04	2.28	7.27	7.74	50.05	0.95	2.21	1.78	15.31	0.57	2.93	6.67
S4-LD(25cm)	16413.86	2.68	7.69	5.58	56.99	2.14	2.66	5.27	19.31	0.85	3.82	3.52
S4-LD(50cm)	16850.78	1.65	8.03	2.47	61.91	0.77	3.48	0.11	21.38	1.58	3.40	5.71
S4-RB(0-5cm)	20946.15	0.19	14.52	5.95	255.06	1.11	3.49	1.25	22.03	1.13	22.78	4.42
S4-RB(30cm)	15435.81	1.34	14.18	2.83	180.53	0.18	3.04	2.75	18.19	0.45	15.99	1.39



Laboratorio Nacional de Geoquímica y Minerología
Universidad Nacional Autónoma de México
Geoquímica Ambiental



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S2-RD (0-5cm)	26317.52	0.02	499.75	1.89	20.52	1.54	19.89	0.28	<LOD	NA	84.54	1.65
S2-RD (25cm)	29186.19	0.67	835.73	2.63	26.85	1.02	33.16	1.80	2.61	1.60	115.22	3.03
S2-RD (50cm)	27885.61	0.70	698.10	1.56	26.64	2.15	27.63	0.36	1.97	0.82	99.19	0.76
S2-RE (0-5cm)	28990.95	0.46	1007.14	1.06	23.59	1.99	97.53	1.87	2.61	1.55	137.10	0.45
S2-RE (25cm)	28888.16	0.43	570.56	0.32	23.15	1.53	28.62	1.28	2.82	1.08	98.65	1.75
S2-RE (50cm)	29224.51	0.56	615.02	1.25	25.18	1.01	30.60	3.46	1.05	0.26	100.19	1.22
S3-A (0-5cm)	18007.46	0.31	346.74	3.25	10.62	0.71	15.00	4.09	<LOD	NA	57.20	3.83
S3-LB (0-5cm)	19158.43	1.29	341.00	1.41	11.29	1.67	15.30	3.87	<LOD	NA	66.39	4.80
S3-LB (25cm)	18752.43	2.15	354.65	0.83	11.18	0.94	18.06	1.53	<LOD	NA	57.14	3.59
S3-LC (0-5cm)	22323.20	1.01	345.15	1.40	14.06	1.32	16.62	2.58	<LOD	NA	67.49	2.11
S3-LC (25cm)	23289.14	0.97	365.97	0.44	13.14	0.64	17.30	2.59	<LOD	NA	69.48	2.14
S3-LC (50cm)	19512.43	0.79	336.29	0.44	11.37	1.15	17.01	2.32	<LOD	NA	59.33	0.42
S3-LD (0-5cm)	26744.78	0.12	463.55	2.74	18.08	1.08	21.93	2.64	<LOD	NA	84.87	1.35
S3-LD (25cm)	23334.67	0.47	453.61	1.54	17.76	1.31	22.50	1.86	1.88	1.63	83.19	1.88
S3-LD (50cm)	25926.05	0.77	406.04	2.17	15.70	1.67	19.61	2.19	<LOD	NA	71.96	1.32
S3-LE (0-5cm)	15332.63	1.97	414.75	0.64	8.71	1.75	18.27	1.99	<LOD	NA	48.22	3.75
S3-LE (25cm)	16344.04	1.58	520.12	2.14	8.28	2.65	12.67	2.12	<LOD	NA	39.19	4.69
S3-LE (50cm)	21290.81	0.52	598.15	3.01	12.47	0.54	14.38	1.38	<LOD	NA	53.32	3.04
S3-RB (0-5cm)	20371.72	2.09	470.64	1.99	17.25	1.85	18.78	2.25	<LOD	NA	71.95	4.20
S3-RB (25cm)	17775.61	1.22	349.35	1.69	11.68	1.82	14.97	1.38	<LOD	NA	62.05	1.24
S3-RC (0-5cm)	22657.88	1.25	676.18	1.26	13.66	2.62	23.72	0.54	<LOD	NA	93.15	2.96
S3-RC (25cm)	32901.99	0.26	607.63	1.68	23.29	2.24	27.43	2.90	<LOD	NA	112.43	4.22
S3-RC (50cm)	30784.80	1.31	646.56	1.54	23.38	2.31	26.99	1.49	<LOD	NA	116.26	0.48
S3-RD (0-5cm)	22383.97	1.48	732.89	0.65	12.46	2.09	21.43	2.13	<LOD	NA	95.46	2.31
S3-RD (25cm)	24939.43	1.52	730.42	0.55	14.10	0.87	23.37	3.46	<LOD	NA	158.84	1.45
S3-RD (50cm)	27375.97	0.75	704.58	2.09	19.35	2.01	24.11	3.08	<LOD	NA	106.91	3.76
S4-LB(0-5cm)	25795.48	3.12	354.60	3.27	12.51	0.22	18.57	2.89	<LOD	NA	75.35	1.17
S4-LB(25cm)	21108.56	3.51	386.02	3.41	17.63	0.23	21.52	0.95	<LOD	NA	83.05	1.77
S4-LB(40cm)	16120.11	2.32	267.34	2.38	7.99	1.78	18.32	1.90	<LOD	NA	69.42	0.29
S4-LC(0-5cm)	28591.41	3.51	551.48	3.36	17.77	1.30	28.50	0.82	<LOD	NA	103.74	1.43
S4-LC(25cm)	32364.74	1.12	460.77	1.07	17.30	0.67	24.46	1.76	<LOD	NA	101.94	1.50
S4-LC(50cm)	36442.36	0.97	613.67	0.85	22.33	1.47	32.97	0.80	<LOD	NA	128.05	1.82
S4-LD(0-5cm)	15495.43	2.40	457.85	2.45	6.67	3.03	20.28	3.83	<LOD	NA	73.53	0.37
S4-LD(25cm)	19911.68	3.82	522.65	3.69	7.93	2.57	22.72	2.95	<LOD	NA	65.26	1.52
S4-LD(50cm)	24907.11	1.76	551.22	1.71	8.78	1.10	24.86	3.22	<LOD	NA	64.39	0.98
S4-RB(0-5cm)	24180.91	0.61	509.02	0.53	16.06	2.03	25.21	0.36	<LOD	NA	90.97	1.74
S4-RB(30cm)	22479.77	1.52	380.82	1.56	12.42	0.56	18.44	1.82	<LOD	NA	70.02	0.67



Laboratorio Nacional de Geoquímica y Minerología
 Universidad Nacional Autónoma de México
 Geoquímica Ambiental



ID Campo	Al		As		Ba		Cd		Cr		Cu	
	mg/kg	RSD %	mg/kg	RSD %	mg/kg	RSD %	mg/kg	RSD %	mg/kg	RSD %	mg/kg	RSD %
S4-RC(0-5cm)	23939.89	1.12	36.23	2.51	245.83	0.14	4.07	1.03	21.14	3.02	56.08	1.42
S4-RC(25cm)	24701.88	0.86	29.45	1.13	299.13	0.56	4.45	1.99	37.31	1.05	47.29	1.24
S4-RC(50cm)	18464.82	1.88	17.95	6.13	243.11	0.57	3.30	1.34	20.22	2.04	24.80	2.48
S4-RD(0-5cm)	34599.32	1.72	35.71	4.36	258.05	1.78	4.69	1.58	21.25	1.20	79.08	1.66
S4-RD(25cm)	43766.11	1.49	34.37	0.78	292.14	0.41	5.02	1.16	29.62	2.56	86.87	4.62
S4-RD(50cm)	27122.88	0.55	36.43	2.01	239.04	0.24	4.42	0.31	20.27	2.77	63.69	1.21
S5-RC(0-5cm)	32283.30	1.86	10.59	7.49	236.15	1.90	5.12	1.93	34.85	1.63	81.72	1.20
S5-A (0-5cm)	10726.69	2.24	6.31	3.99	112.89	2.31	2.17	4.78	7.24	0.87	13.38	0.54
S5-LB (0-5cm)	8661.06	2.52	4.97	3.84	80.84	2.63	1.67	1.97	5.92	1.04	7.62	2.28
S5-LB (25cm)	8764.37	2.05	<LOD	NA	92.47	2.08	1.82	2.12	6.81	3.15	7.55	4.86
S5-LC (0-5cm)	13134.74	2.65	<LOD	NA	135.13	2.78	7.77	2.35	38.54	0.67	10.95	2.16
S5-LC (25cm)	11817.57	3.21	6.39	1.82	111.10	3.47	3.05	3.52	12.67	1.78	12.28	3.09
S5-LC (50cm)	11850.80	3.38	5.73	2.46	112.54	3.59	3.42	3.77	14.88	1.03	9.60	0.99
S5-LD (0-5cm)	13160.65	0.94	7.17	11.26	132.53	1.07	3.50	4.99	18.53	2.12	14.40	3.27
S5-LD (25cm)	13057.69	2.47	6.74	1.79	139.78	2.72	4.42	7.09	21.57	5.39	67.90	8.49
S5-LD (50cm)	15250.87	2.56	9.75	7.80	173.68	2.73	6.49	1.01	49.87	2.77	62.24	4.50
S5-LE (0-5cm)	19883.60	1.39	11.91	11.26	231.38	1.36	5.47	1.49	42.20	0.96	44.47	0.69
S5-LE (25cm)	21661.61	1.60	13.49	9.56	248.89	1.66	6.19	2.93	44.47	1.40	44.79	2.41
S5-LE(50cm)	21117.99	2.09	14.48	3.36	256.95	2.36	4.89	2.71	31.49	3.78	38.99	4.92
S5-LE roca	2208.54	3.38	<LOD	NA	28.47	3.42	0.78	4.53	1.73	2.43	16.63	1.60
S5-RB (0-5cm)	9745.38	1.31	5.11	11.61	83.81	1.23	1.99	0.83	7.91	0.66	17.11	2.24
S5-RB (25cm)	12414.88	0.37	5.58	3.92	105.03	0.53	2.20	1.26	8.22	1.50	22.07	1.33
S5-RC roca	8360.28	2.92	<LOD	NA	51.05	2.82	1.59	3.26	2.34	1.59	16.60	2.35
S5-RD (0-5cm)	18039.51	1.36	4.87	1.76	139.99	1.47	3.56	2.71	10.78	1.40	430.85	2.37
S5-RD roca	10492.80	4.16	<LOD	NA	52.58	4.42	2.44	1.70	0.91	2.39	19.36	3.33
S6-LB(0-5cm)	8735.23	2.14	6.08	1.55	97.68	1.96	1.90	1.88	6.88	1.27	35.29	1.91
S6-LB(25cm)	9871.25	2.47	5.69	1.65	92.75	2.62	2.29	3.12	7.64	0.80	21.27	2.04
S6-LB(50cm)	7568.03	1.64	4.77	8.31	82.27	1.83	1.95	1.21	6.96	1.25	15.67	1.25
S6-LB(100cm)	9866.39	1.63	7.00	8.06	89.52	1.50	2.11	1.53	6.96	1.52	10.94	2.30
S6-LC(0-5cm)	10064.82	3.99	6.06	8.48	95.39	4.08	2.13	0.34	7.82	1.93	11.09	3.92
S6-LC(25cm)	9430.70	0.46	<LOD	NA	80.10	0.24	2.42	2.52	7.79	2.95	11.57	2.49
S6-LC(50cm)	10647.40	0.39	<LOD	NA	99.25	0.10	2.21	1.95	11.70	2.58	13.19	1.24
S6-LC(70cm)	9953.09	2.46	<LOD	NA	92.25	2.59	2.54	2.15	8.41	1.00	10.11	1.86



Laboratorio Nacional de Geoquímica y Minerología
 Universidad Nacional Autónoma de México
 Geoquímica Ambiental



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	mg/kg	RSD %	mg/kg	RSD %	mg/kg	RSD %	mg/kg	RSD %	mg/kg	RSD %	mg/kg	RSD %
S4-RC(0-5cm)	28945.44	1.66	542.14	1.46	17.04	0.65	28.72	1.80	<LOD	NA	104.55	2.60
S4-RC(25cm)	35415.32	0.82	548.34	0.76	21.14	0.33	27.37	1.36	<LOD	NA	103.08	1.01
S4-RC(50cm)	23915.32	2.49	360.90	2.58	14.22	0.36	18.72	3.99	<LOD	NA	72.30	2.20
S4-RD(0-5cm)	32147.09	1.92	780.88	2.07	20.83	1.77	40.02	1.91	<LOD	NA	138.70	1.06
S4-RD(25cm)	34094.37	2.09	856.18	2.07	29.08	1.14	41.96	1.40	<LOD	NA	153.09	2.49
S4-RD(50cm)	31167.49	0.35	702.83	0.38	19.33	1.54	38.14	2.31	<LOD	NA	135.43	2.72
S5-RC(0-5cm)	34500.39	2.10	778.60	2.27	23.24	3.36	30.49	2.99	<LOD	NA	119.33	1.51
S5-A (0-5cm)	12364.15	0.58	312.72	0.49	9.00	2.87	12.39	3.00	<LOD	NA	53.10	0.36
S5-LB (0-5cm)	10400.06	0.67	220.34	1.86	5.71	0.37	9.90	1.33	<LOD	NA	42.14	0.94
S5-LB (25cm)	11593.06	1.82	259.12	2.55	6.40	1.24	11.28	3.59	<LOD	NA	40.25	3.85
S5-LC (0-5cm)	46170.35	0.82	426.70	1.47	16.14	2.71	44.75	1.84	<LOD	NA	85.51	0.74
S5-LC (25cm)	18755.07	1.55	264.10	1.09	9.91	1.40	12.98	2.01	<LOD	NA	64.00	2.48
S5-LC (50cm)	22889.52	1.77	297.43	0.87	10.74	1.96	13.26	0.61	<LOD	NA	57.82	0.95
S5-LD (0-5cm)	22169.72	0.82	333.69	2.96	13.21	1.31	17.41	2.73	<LOD	NA	81.29	2.71
S5-LD (25cm)	26231.99	3.46	322.74	0.93	12.39	0.48	16.84	0.44	2.40	0.39	67.33	5.00
S5-LD (50cm)	42563.32	3.16	495.28	3.65	21.61	0.89	28.61	1.92	2.23	0.77	107.46	2.28
S5-LE (0-5cm)	34630.51	1.37	536.57	0.92	21.13	0.62	29.94	1.49	<LOD	NA	123.83	1.11
S5-LE (25cm)	39988.20	1.98	547.38	2.50	22.11	1.91	29.76	1.77	2.40	1.23	105.53	1.45
S5-LE(50cm)	30422.25	2.77	500.92	1.87	19.00	2.92	26.31	1.37	<LOD	NA	104.27	3.58
S5-LE roca	4944.46	3.93	131.24	2.99	0.84	8.62	4.17	1.07	<LOD	NA	29.66	0.85
S5-RB (0-5cm)	12850.17	1.35	298.92	0.71	6.11	2.26	9.57	3.22	<LOD	NA	43.97	2.07
S5-RB (25cm)	13422.85	1.00	373.06	2.22	6.79	1.48	11.53	1.46	<LOD	NA	53.16	0.72
S5-RC roca	11574.20	3.05	391.72	3.43	2.90	2.62	8.18	4.74	<LOD	NA	69.79	2.06
S5-RD (0-5cm)	22508.10	1.66	1255.17	2.25	8.42	2.94	39.73	2.95	<LOD	NA	173.79	1.20
S5-RD roca	17270.67	5.17	556.54	2.18	1.90	8.67	5.49	8.32	<LOD	NA	97.45	2.80
S6-LB(0-5cm)	10814.95	2.55	192.21	2.61	5.16	1.38	9.55	4.09	<LOD	NA	60.87	2.23
S6-LB(25cm)	12699.55	2.37	207.79	0.57	5.83	1.84	10.30	2.25	<LOD	NA	45.26	2.85
S6-LB(50cm)	12580.61	0.92	195.40	3.34	5.42	2.24	9.69	2.87	<LOD	NA	33.15	1.24
S6-LB(100cm)	13618.25	1.67	241.85	2.02	6.60	3.19	10.76	1.59	<LOD	NA	39.14	1.23
S6-LC(0-5cm)	12880.30	1.66	232.65	3.39	7.33	0.59	10.50	5.31	<LOD	NA	42.93	1.63
S6-LC(25cm)	14830.22	0.96	203.15	1.11	6.09	2.71	9.57	3.42	<LOD	NA	38.94	1.63
S6-LC(50cm)	13970.10	2.25	253.29	2.15	9.49	1.92	11.69	0.69	<LOD	NA	42.55	2.49
S6-LC(70cm)	15956.59	1.46	222.61	0.74	7.87	1.10	10.30	3.37	<LOD	NA	41.24	1.50



Laboratorio Nacional de Geoquímica y Minerología
Universidad Nacional Autónoma de México
Geoquímica Ambiental



ID Campo	Al		As		Ba		Cd		Cr		Cu	
	mg/kg	RSD %	mg/kg	RSD %	mg/kg	RSD %	mg/kg	RSD %	mg/kg	RSD %	mg/kg	RSD %
S6-LD(0-5cm)	24894.68	2.53	9.96	2.52	242.17	2.81	4.46	4.00	27.02	3.06	31.08	3.13
S6-LD(25cm)	24053.73	1.61	8.74	11.90	255.70	1.80	4.73	5.61	28.77	3.64	21.59	3.96
S6-LD(50cm)	20919.35	2.79	9.77	8.24	233.46	2.95	4.17	3.75	23.20	3.65	19.75	3.91
S6-LE(0-5cm)	33976.18	2.03	<LOD	NA	141.95	2.24	4.06	3.78	32.25	2.58	15.33	2.87
S6-LE(Roca)	11356.45	1.84	<LOD	NA	63.88	1.89	2.56	0.82	4.06	1.70	2.55	0.82
S6-RB(0-5cm)	9042.06	4.18	<LOD	NA	104.89	4.35	2.13	3.56	9.19	1.67	15.83	5.02
S6-RB(25cm)	11396.54	0.62	6.13	6.47	112.36	0.66	2.06	1.17	7.71	0.95	10.16	2.80
S6-RB(50cm)	7772.12	1.93	4.47	5.89	97.29	2.04	1.91	3.03	7.48	0.77	9.49	3.94
S6-RB(80cm)	8851.05	1.61	5.18	9.71	80.59	1.67	2.10	1.17	7.33	1.00	8.82	1.99
S6-RC(0-5cm)	19590.33	2.28	7.69	4.41	203.78	2.39	3.50	6.20	18.42	2.48	31.81	3.74
S6-RC(25cm)	21325.42	1.09	8.23	7.71	205.38	1.04	3.57	3.39	17.90	4.23	31.22	4.33
S6-RC(50cm)	21112.23	4.48	9.12	4.08	195.26	4.72	3.63	1.80	18.12	2.75	38.10	1.07
S6-RC(100cm)	18891.64	1.06	8.65	8.55	178.15	0.99	3.72	1.98	19.61	2.03	25.53	1.64
S6-RD(0-5cm)	20852.58	5.35	8.29	8.67	218.87	5.45	4.11	4.47	24.23	2.22	24.64	2.53
S6-RD(25cm)	17783.00	2.10	11.23	7.46	236.28	2.25	3.38	2.21	17.35	2.27	19.99	3.20
S6-RD(50cm)	21914.84	4.07	8.46	8.90	246.41	4.23	4.06	5.08	22.84	2.34	22.49	2.66
S7-A (0-5cm)	13616.91	1.60	6.08	15.99	130.39	1.75	3.02	1.40	12.72	1.34	21.95	2.74
S7-A (5-25cm)	10899.80	1.60	4.77	3.17	98.16	1.73	2.15	9.46	7.28	1.34	19.82	2.62
S7-A (25-50cm)	10848.45	2.35	4.16	3.52	106.72	2.61	2.18	2.57	8.03	0.08	16.86	1.85
S7-A (50-100cm)	9983.11	3.01	3.79	3.04	92.96	3.25	2.21	4.16	8.31	1.86	20.64	1.66
S7-A (100-150cm)	11888.12	3.71	3.75	2.48	99.68	3.99	2.43	3.02	9.08	0.68	17.17	1.14
S7-A (150-200cm)	20739.76	0.63	8.13	3.55	201.51	0.67	4.49	0.50	18.77	1.13	26.06	1.09
S7-A (200-250cm)	12681.12	1.93	2.71	2.82	125.83	2.05	4.15	2.70	14.46	2.90	15.76	1.71
S7-A (250-290cm)	8850.30	0.85	9.42	10.77	76.51	1.01	2.23	1.48	6.94	1.95	9.45	2.60
S7-A (+290cm)	8687.43	1.15	3.89	4.69	75.86	1.26	1.80	3.27	6.24	1.59	10.97	3.04
S7-LB (0-5cm)	13381.62	0.57	7.25	8.80	137.85	0.63	7.32	3.00	37.83	2.01	20.54	1.70
S7-LB (5-25cm)	12154.94	1.45	7.80	1.94	169.49	1.60	4.11	0.95	17.94	1.07	25.19	0.40
S7-LB (25-50cm)	13065.84	0.21	7.55	2.33	160.22	0.25	4.89	1.70	21.49	2.88	22.12	2.97
S7-LB (50-100cm)	9291.46	0.88	7.27	2.78	129.53	0.87	4.77	0.71	21.63	0.93	15.73	0.78
S7-LB (100-150cm)	9185.91	2.92	2.99	5.11	118.38	3.15	5.09	0.99	18.56	1.16	20.57	1.80
S7-LB (150-200cm)	12081.12	1.58	6.72	10.87	132.17	1.70	2.96	0.66	14.43	0.87	36.35	1.77
S7-LB (200-250cm)	8491.25	3.53	5.14	4.01	137.13	3.83	5.46	1.30	22.71	1.68	8.32	3.17
S7-LB (250-300cm)	6862.11	0.69	3.15	2.21	105.37	0.85	3.39	3.09	13.48	0.76	8.56	1.47
S7-LB (+300cm)	8601.75	2.54	7.55	1.28	114.00	2.62	3.50	1.87	13.50	2.36	8.96	4.45



Laboratorio Nacional de Geoquímica y Minerología
 Universidad Nacional Autónoma de México
 Geoquímica Ambiental



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S6-LD(0-5cm)	26665.96	0.57	531.61	1.11	18.00	1.61	23.48	8.16	<LOD	NA	96.38	2.90
S6-LD(25cm)	30154.35	1.62	487.44	2.45	19.08	0.64	20.29	2.47	<LOD	NA	92.72	3.31
S6-LD(50cm)	26124.29	0.90	472.31	2.35	16.80	2.20	20.01	1.35	<LOD	NA	80.90	3.64
S6-LE(0-5cm)	26887.62	0.98	893.28	0.68	18.72	2.24	18.13	3.93	<LOD	NA	124.10	2.79
S6-LE(Roca)	16924.07	1.62	525.13	1.48	11.52	0.77	5.90	7.92	<LOD	NA	61.36	2.78
S6-RB(0-5cm)	13267.91	0.97	237.48	1.50	7.10	2.57	10.93	5.69	<LOD	NA	42.44	1.45
S6-RB(25cm)	13034.19	3.34	252.43	2.59	10.62	0.41	10.47	1.60	<LOD	NA	41.32	1.37
S6-RB(50cm)	12250.79	1.79	226.03	0.60	6.09	1.44	9.39	0.24	<LOD	NA	37.67	2.09
S6-RB(80cm)	13437.80	1.63	224.36	1.09	6.29	1.47	10.38	3.38	<LOD	NA	41.59	2.12
S6-RC(0-5cm)	21847.97	1.45	457.91	1.48	14.77	1.11	18.62	2.03	<LOD	NA	79.23	3.30
S6-RC(25cm)	22248.37	0.64	456.80	3.90	14.17	0.42	18.38	4.14	<LOD	NA	76.28	4.43
S6-RC(50cm)	22397.74	0.76	539.38	1.54	23.89	0.90	21.13	1.53	<LOD	NA	83.91	2.60
S6-RC(100cm)	23263.55	0.55	429.07	5.48	13.47	2.19	18.54	0.81	<LOD	NA	71.86	2.03
S6-RD(0-5cm)	25444.19	1.00	448.58	0.80	15.81	0.34	18.81	0.56	<LOD	NA	84.94	2.34
S6-RD(25cm)	21606.16	0.06	420.68	1.05	16.28	1.41	20.25	1.96	<LOD	NA	77.86	2.67
S6-RD(50cm)	25367.59	1.23	466.51	2.90	16.49	1.36	19.76	0.87	<LOD	NA	81.72	2.47
S7-A (0-5cm)	18281.97	1.58	324.44	1.52	11.80	2.77	10.36	5.79	1.62	0.85	54.95	1.81
S7-A (5-25cm)	14491.62	1.97	255.84	2.00	9.41	1.43	7.83	1.71	1.31	2.00	44.42	2.39
S7-A (25-50cm)	15176.09	1.88	238.64	1.83	9.43	2.49	7.64	6.05	1.65	2.48	44.06	1.89
S7-A (50-100cm)	14634.12	2.24	265.92	2.69	9.55	3.58	7.95	6.66	1.11	3.27	47.01	1.84
S7-A (100-150cm)	15896.52	0.50	262.34	3.77	9.70	2.58	8.30	9.23	1.18	1.23	43.05	1.97
S7-A (150-200cm)	26686.98	0.65	392.85	1.11	16.62	1.00	14.73	6.87	2.18	1.68	77.06	0.86
S7-A (200-250cm)	25709.94	0.84	255.75	0.56	13.39	0.51	10.24	1.84	1.70	1.05	63.83	3.27
S7-A (250-290cm)	15198.96	0.99	183.88	2.45	8.45	2.91	5.71	13.82	2.30	1.90	40.51	1.10
S7-A (+290cm)	13007.07	1.37	190.37	1.48	8.50	2.36	4.39	7.62	<LOD	NA	38.98	2.03
S7-LB (0-5cm)	44271.63	0.59	447.02	1.89	20.33	2.14	18.99	2.82	2.91	1.06	85.01	2.00
S7-LB (5-25cm)	24566.34	1.08	386.24	0.96	16.66	0.53	12.42	3.24	1.26	0.49	71.51	1.28
S7-LB (25-50cm)	28598.67	0.22	404.66	0.21	17.59	0.24	13.28	2.96	1.97	0.55	74.56	1.80
S7-LB (50-100cm)	29147.28	0.47	343.21	0.44	16.39	1.14	12.73	4.57	0.94	1.52	63.52	0.90
S7-LB (100-150cm)	30318.11	0.45	312.45	1.41	14.12	2.46	14.06	2.63	3.31	2.44	65.07	0.52
S7-LB (150-200cm)	21385.20	0.99	308.34	0.83	11.25	0.77	12.11	1.15	2.10	1.15	57.85	1.77
S7-LB (200-250cm)	33195.75	0.42	363.62	1.68	15.27	1.33	12.33	5.45	1.33	0.43	58.50	1.58
S7-LB (250-300cm)	21869.11	1.16	225.59	2.23	10.94	1.25	7.83	4.97	1.58	0.88	45.33	0.57
S7-LB (+300cm)	21967.53	0.43	227.34	1.18	12.32	2.14	8.55	2.71	1.72	1.02	51.85	3.00



Laboratorio Nacional de Geoquímica y Minerología
Universidad Nacional Autónoma de México
Geoquímica Ambiental



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S7-LC (0-5cm)	22705.26	1.43	10.29	2.55	253.87	1.52	5.08	1.97	22.49	3.43	32.09	2.38
S7-LC (5-25cm)	19775.48	0.44	8.20	2.65	210.45	0.50	4.69	0.85	22.57	0.57	25.66	0.93
S7-LC (25-50cm)	24082.85	1.84	10.45	1.70	238.86	2.03	5.11	0.59	24.49	2.54	30.98	2.31
S7-LC (50-100cm)	27087.08	2.63	9.26	2.12	237.56	2.81	5.90	0.96	29.39	1.55	43.67	1.80
S7-LC (100-150cm)	13566.03	2.85	8.65	2.25	145.19	3.02	4.53	1.19	17.47	2.51	15.36	2.55
S7-LC (+150cm)	17263.87	1.21	7.60	0.47	200.50	1.23	4.97	2.58	25.27	2.25	13.94	3.34
S7-RB (0-5cm)	15630.08	1.67	7.05	0.24	168.58	1.66	3.86	2.91	15.37	2.21	24.54	3.54
S7-RB (5-25cm)	9664.61	3.46	5.36	1.42	103.32	3.46	2.76	0.35	10.98	2.53	11.23	0.55
S7-RB (25-50cm)	11621.87	1.63	6.01	1.09	117.14	1.84	3.72	1.61	14.25	1.50	14.14	1.36
S7-RB (50-100cm)	10583.15	2.01	3.38	1.54	100.50	2.11	3.33	1.95	11.73	1.28	11.41	0.12
S7-RB (100-150cm)	6888.27	1.40	2.65	2.30	85.89	1.49	1.77	4.86	6.12	1.93	9.54	0.81
S7-RB (150-200cm)	9035.67	1.53	2.18	4.97	122.99	1.66	3.60	4.69	19.11	2.28	12.81	0.38
S7-RB (200-250cm)	12215.05	2.04	3.90	2.71	112.58	2.08	5.28	3.12	21.61	1.43	24.42	1.79
S7-RB (250-300cm)	11980.48	1.85	4.59	2.79	118.98	1.98	2.36	0.49	8.88	2.21	20.88	1.59
S7-RB (300-350cm)	13208.68	0.28	6.93	3.98	170.18	0.32	3.45	3.10	13.28	1.51	43.30	2.02
S7-RB (+350cm)	10199.07	2.10	2.22	3.38	110.32	2.26	3.19	3.07	10.27	2.01	16.11	2.77
S7-RC (0-5cm)	14315.81	1.12	9.43	3.50	201.38	1.27	5.24	2.87	24.42	0.61	24.41	0.72
S7-RC (5-25cm)	17310.59	0.97	9.93	6.64	226.15	1.10	5.23	0.80	24.26	1.27	27.21	2.04
S7-RC (25-50cm)	12044.30	1.02	5.94	6.62	169.12	1.10	4.71	0.19	20.44	2.29	19.79	2.58
S7-RC (50-100cm)	13031.78	0.29	6.50	1.61	168.90	0.35	4.52	1.21	19.18	3.53	16.04	2.52
S7-RC (100-150cm)	13703.17	1.60	5.56	1.95	174.79	1.74	4.19	2.37	18.72	1.50	15.40	1.43
S7-RC (+150cm)	13821.17	1.86	7.38	4.86	186.80	2.01	4.47	2.47	21.49	2.10	18.45	3.27
S8-A (0-5cm)	10589.51	1.71	5.32	4.69	131.87	1.96	2.05	3.16	8.10	0.82	12.83	1.59
S8-LB(0-5cm)	12185.00	3.02	4.36	3.12	125.28	3.25	3.25	1.71	10.83	0.69	11.86	0.49
S8-LB(25cm)	12771.34	2.50	<LOD	0.49	111.04	2.54	3.01	0.85	15.53	1.49	12.28	1.98
S8-LB(40cm)	17579.88	1.21	3.09	3.10	147.36	1.26	5.44	6.51	27.21	3.67	19.17	2.36
S8-LC(0-5cm)	20069.34	0.59	7.17	3.07	217.44	0.78	3.25	1.24	15.63	0.50	30.88	1.20
S8-LC(25cm)	21890.20	1.33	11.65	2.87	248.10	1.38	4.25	2.13	28.83	1.12	24.06	1.37
S8-LC(50cm)	18266.15	1.93	7.95	0.80	209.81	2.12	3.66	4.28	20.29	2.02	20.58	6.27
S8-LC(100cm)	10284.59	1.32	8.97	0.19	136.94	0.86	2.54	2.28	13.74	0.63	9.26	4.11
S8-LC(150cm)	8395.19	0.59	3.32	1.21	107.00	0.56	3.14	3.46	12.75	2.39	11.92	4.40
S8-LD(0-5cm)	12888.56	1.84	11.17	7.42	126.05	0.76	4.28	0.14	20.27	1.29	10.17	2.43
S8-LD(25cm)	13718.80	1.72	14.96	8.56	157.85	0.67	6.32	4.15	36.74	3.00	17.77	2.33
S8-LD(50cm)	25374.95	1.20	19.22	7.30	253.68	0.08	3.61	4.88	20.91	2.28	33.62	1.14
S8-LD(100cm)	18613.04	0.70	12.36	4.14	172.03	1.08	3.06	2.16	16.79	3.12	11.40	1.34
S8-LD(120cm)	22889.86	0.98	17.42	5.72	253.73	0.35	4.03	1.65	24.27	1.30	19.59	1.83



Laboratorio Nacional de Geoquímica y Minerología
Universidad Nacional Autónoma de México
Geoquímica Ambiental



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S7-LC (0-5cm)	29048.37	1.00	548.69	1.66	20.79	0.66	17.70	2.79	0.92	1.74	95.66	2.39
S7-LC (5-25cm)	27404.96	1.23	445.25	1.45	18.18	1.24	14.94	3.98	3.23	1.54	86.39	0.21
S7-LC (25-50cm)	29215.30	0.47	546.41	1.45	20.63	1.59	17.35	3.38	1.68	0.10	98.59	1.95
S7-LC (50-100cm)	33792.40	1.03	668.48	0.63	22.26	1.41	19.05	3.50	2.73	1.40	116.63	1.97
S7-LC (100-150cm)	28431.67	0.23	307.34	1.94	13.89	1.64	10.27	6.64	2.31	1.28	63.02	1.92
S7-LC (+150cm)	29548.42	0.66	419.28	0.38	18.05	1.17	13.31	6.62	4.17	0.72	76.57	2.59
S7-RB (0-5cm)	23778.87	1.23	401.31	0.58	14.77	0.96	13.70	2.10	0.92	2.88	65.91	2.28
S7-RB (5-25cm)	18141.54	1.33	232.31	0.26	10.00	2.27	6.84	6.08	2.27	0.80	43.68	1.96
S7-RB (25-50cm)	23244.61	0.31	276.91	1.43	12.00	2.21	9.51	2.97	1.48	1.70	53.60	1.64
S7-RB (50-100cm)	21780.46	1.28	248.46	2.21	10.11	2.00	7.42	9.15	0.63	1.82	44.58	0.41
S7-RB (100-150cm)	12932.94	1.34	183.21	1.28	7.76	1.31	6.11	5.68	<LOD	NA	34.93	1.29
S7-RB (150-200cm)	23207.42	1.22	312.98	2.55	13.61	1.61	7.12	3.70	1.86	0.98	50.55	1.59
S7-RB (200-250cm)	30011.94	0.83	295.68	2.65	13.90	1.73	11.02	11.10	1.38	1.65	70.72	1.57
S7-RB (250-300cm)	15765.26	1.73	238.08	1.70	10.42	3.86	6.45	6.98	1.89	2.36	48.47	1.62
S7-RB (300-350cm)	20923.07	0.48	247.89	2.12	13.72	0.34	8.14	4.20	2.78	1.99	74.74	1.34
S7-RB (+350cm)	19914.67	0.94	211.51	2.25	10.77	1.94	5.82	9.82	1.50	0.59	52.81	2.75
S7-RC (0-5cm)	30569.23	0.42	453.73	0.47	19.87	1.92	17.20	5.05	3.31	1.43	80.90	0.21
S7-RC (5-25cm)	30895.54	0.36	457.50	0.24	20.13	1.37	16.72	0.22	1.87	0.77	84.54	1.44
S7-RC (25-50cm)	27914.96	0.24	393.78	1.42	17.07	1.03	13.69	5.43	3.51	1.12	74.74	2.22
S7-RC (50-100cm)	26751.71	0.67	401.03	1.09	17.11	1.12	13.48	2.55	0.66	1.12	76.06	2.39
S7-RC (100-150cm)	24963.93	0.83	376.75	1.54	16.45	1.15	13.55	4.18	1.90	0.54	70.09	0.77
S7-RC (+150cm)	27144.33	0.92	411.50	2.30	17.87	1.30	15.76	5.06	1.94	2.50	74.03	2.55
S8-A (0-5cm)	13377.21	1.23	363.23	1.15	9.68	1.02	6.68	8.03	0.54	1.78	45.90	0.59
S8-LB(0-5cm)	21068.45	2.38	391.00	2.24	7.37	2.13	12.45	4.74	<LOD	NA	43.45	0.53
S8-LB(25cm)	18974.18	0.88	168.12	2.52	8.91	1.42	14.32	2.63	<LOD	NA	48.03	1.35
S8-LB(40cm)	31378.95	1.15	342.22	0.22	13.09	1.96	17.35	1.74	<LOD	NA	71.95	3.34
S8-LC(0-5cm)	18604.62	0.94	439.62	3.17	12.25	1.62	17.91	1.46	<LOD	NA	70.23	0.72
S8-LC(25cm)	26148.75	1.28	471.19	2.15	17.69	1.97	22.32	2.08	<LOD	NA	84.36	1.06
S8-LC(50cm)	22643.18	0.07	352.96	2.96	13.45	0.90	14.47	0.95	<LOD	NA	69.84	3.04
S8-LC(100cm)	19155.04	1.15	235.65	1.03	8.60	1.54	11.57	3.60	<LOD	NA	49.43	0.68
S8-LC(150cm)	19417.26	2.04	237.95	4.31	8.55	2.73	12.39	5.60	<LOD	NA	45.01	2.58
S8-LD(0-5cm)	28903.65	1.57	351.83	1.41	9.97	2.80	16.27	7.71	<LOD	NA	62.95	1.33
S8-LD(25cm)	50807.60	1.24	405.22	1.33	14.90	0.67	19.62	4.31	<LOD	NA	76.80	2.88
S8-LD(50cm)	26427.19	2.14	581.96	2.09	15.40	0.89	24.41	1.02	<LOD	NA	88.96	1.92
S8-LD(100cm)	22982.05	1.04	416.64	1.10	10.73	1.23	18.35	2.53	<LOD	NA	64.05	2.63
S8-LD(120cm)	29386.57	1.79	491.46	1.70	17.03	0.65	23.22	1.40	<LOD	NA	83.67	0.47



Laboratorio Nacional de Geoquímica y Minerología
 Universidad Nacional Autónoma de México
 Geoquímica Ambiental



ID Campo	Al		As		Ba		Cd		Cr		Cu	
	mg/kg	RSD %	mg/kg	RSD %	mg/kg	RSD %	mg/kg	RSD %	mg/kg	RSD %	mg/kg	RSD %
S8-RB (0-5cm)	9361.68	1.96	6.11	1.16	105.32	2.16	2.01	4.25	7.34	1.04	19.99	0.35
S8-RB (5-30cm)	8486.32	1.23	4.37	1.89	90.16	1.02	1.08	4.09	6.18	1.27	48.54	1.91
S8-RB (30-45cm)	16189.84	0.90	26.38	2.63	204.83	1.55	<LD	NA	18.57	0.48	44.57	0.72
S8-RB (45-70cm)	16907.50	2.02	9.69	1.56	204.92	2.05	3.54	3.09	15.32	2.89	16.18	2.63
S8-RC (0-5cm)	24646.00	4.21	5.35	1.06	249.04	4.51	3.08	0.89	17.63	2.28	74.17	2.90
S8-RC (5-25cm)	28430.76	2.85	11.06	0.32	233.74	2.58	3.13	0.25	17.37	1.91	32.72	1.44
S8-RC (25-50cm)	26538.38	3.53	8.20	1.25	231.39	3.55	3.11	0.57	18.50	2.09	53.44	2.17
S8-RC (50-100cm)	11952.44	2.57	9.66	3.25	132.23	2.90	3.10	0.88	17.03	2.54	27.81	8.78
S8-RC (+100cm)	24465.59	0.96	11.32	1.41	212.24	0.99	2.93	3.15	18.30	2.13	30.19	1.97
S9-A (0-5cm)	12282.77	1.59	6.08	0.83	128.10	1.74	3.49	2.48	12.96	0.99	307.83	9.12
S9-A (5-25cm)	9103.24	2.09	5.74	1.40	103.69	2.34	2.98	1.58	12.52	1.11	181.12	3.64
S9-A (25-50cm)	9053.73	1.90	5.02	0.44	100.88	2.21	5.49	2.20	8.96	1.26	141.40	4.61
S9-A (50-100cm)	9840.15	0.84	6.78	0.44	99.23	0.94	2.58	1.43	11.78	1.21	142.61	4.34
S9-A (100-150cm)	12254.57	0.72	6.28	2.74	132.23	0.81	2.90	6.56	9.88	2.37	89.03	1.30
S9-A (150-200cm)	12211.44	1.46	5.82	1.54	110.72	1.70	3.58	6.12	14.11	2.80	65.31	2.14
S9-A (200-250cm)	12172.79	1.92	6.20	2.17	127.54	2.23	2.20	1.97	8.29	1.70	57.92	1.86
S9-LB (0-5cm)	23165.02	4.13	11.71	0.64	249.88	4.48	3.34	2.18	22.40	0.50	27.02	0.62
S9-LB (5-25cm)	6488.64	0.98	4.51	2.14	90.73	1.06	1.60	3.00	5.68	2.62	9.61	2.47
S9-LB (25-50cm)	7904.68	1.54	4.76	3.01	93.13	1.57	2.28	4.67	9.00	1.57	8.78	2.79
S9-LB (50-100cm)	7276.94	3.59	3.29	1.99	94.03	3.85	2.69	1.08	10.96	0.21	9.07	1.56
S9-LB (100-150cm)	7050.21	2.32	5.65	1.69	95.12	2.48	1.83	1.56	7.63	1.48	8.33	2.93
S9-LB (150-200cm)	6454.20	0.55	4.52	1.26	75.33	0.72	1.45	2.21	4.81	1.09	6.16	0.91
S9-LB (200-250cm)	7074.23	1.86	5.26	1.68	82.71	2.01	1.43	4.05	4.94	1.86	7.44	2.10
S9-LB (250-300cm)	7521.60	0.66	2.37	1.54	84.49	0.79	1.52	3.63	5.84	4.22	7.46	3.16
S9-LC (0-5cm)	12919.39	1.87	4.95	0.65	146.60	1.98	4.25	2.63	22.79	0.54	25.84	1.06
S9-LC (5-25cm)	10575.90	1.14	7.43	0.55	119.95	1.23	3.27	1.50	16.04	1.62	25.03	1.13
S9-LC (25-50cm)	13408.61	2.44	7.29	2.09	151.40	2.53	3.42	1.31	35.09	0.64	22.79	0.88
S9-LC (50-100cm)	14544.29	1.09	6.42	4.88	165.27	1.20	3.54	3.22	20.55	1.98	23.57	2.43
S9-LC (100-150cm)	12112.96	1.83	3.63	3.27	132.64	2.00	3.00	3.90	12.62	3.06	24.97	1.92
S9-LC (150-200cm)	10069.96	1.35	4.21	3.41	108.99	1.45	1.85	2.51	7.32	1.29	20.73	3.20



Laboratorio Nacional de Geoquímica y Minerología
Universidad Nacional Autónoma de México
Geoquímica Ambiental



ID Campo	Fe		Mn		Ni		Pb		Sb		Zn	
	mg/kg	RSD %	mg/kg	RSD %	mg/kg	RSD %	mg/kg	RSD %	mg/kg	RSD %	mg/kg	RSD %
S8-RB (0-5cm)	14076.96	1.56	343.41	1.59	10.27	0.94	9.86	3.99	<LOD	NA	46.22	0.89
S8-RB (5-30cm)	10373.70	1.87	245.04	0.73	5.77	1.95	7.88	5.52	<LOD	NA	30.72	1.50
S8-RB (30-45cm)	37964.00	1.19	546.94	1.14	3.64	4.56	24.80	1.53	<LOD	NA	41.19	3.55
S8-RB (45-70cm)	21054.92	0.77	602.28	0.77	14.26	0.61	26.02	1.90	3.36	0.15	69.37	1.80
S8-RC (0-5cm)	21601.25	0.27	651.26	5.12	16.07	1.84	21.42	2.17	<LOD	NA	73.99	1.79
S8-RC (5-25cm)	21663.97	1.64	592.70	1.80	12.61	0.95	18.21	3.65	<LOD	NA	67.43	1.35
S8-RC (25-50cm)	21632.61	0.95	421.98	3.46	14.34	1.40	19.81	2.91	<LOD	NA	70.71	1.57
S8-RC (50-100cm)	23194.97	1.44	372.38	3.71	11.17	0.68	15.87	6.65	<LOD	NA	54.15	2.22
S8-RC (>100cm)	21839.32	1.63	528.82	1.31	13.32	2.61	18.26	4.90	<LOD	NA	64.21	2.22
S9-A (0-5cm)	18941.97	0.66	313.75	0.80	8.88	0.47	14.29	1.81	1.57	2.46	51.17	0.38
S9-A (5-25cm)	17805.54	1.29	304.16	0.42	9.06	1.00	12.23	4.20	2.63	2.13	51.12	0.43
S9-A (25-50cm)	15929.04	0.03	261.70	1.79	6.73	1.05	14.58	1.71	1.89	3.62	40.23	1.53
S9-A (50-100cm)	16162.30	0.96	311.45	1.69	9.07	2.83	26.55	3.32	1.22	0.85	53.32	2.19
S9-A (100-150cm)	15456.99	0.62	239.95	2.51	7.63	2.47	12.04	4.11	0.53	1.39	50.86	2.24
S9-A (150-200cm)	21490.51	1.23	263.24	0.12	9.59	2.18	15.09	6.31	1.56	0.88	50.86	0.53
S9-A (200-250cm)	14032.09	3.28	295.58	3.31	7.97	1.78	12.58	3.48	2.53	1.24	54.90	0.75
S9-LB (0-5cm)	19342.89	0.25	506.70	0.32	22.99	0.90	15.33	2.05	<LOD	NA	71.83	0.28
S9-LB (5-25cm)	10583.44	1.02	172.90	0.95	6.90	1.51	5.15	8.58	<LOD	NA	32.31	1.56
S9-LB (25-50cm)	15209.68	0.18	186.83	0.90	8.81	2.49	5.77	4.64	<LOD	NA	39.05	2.44
S9-LB (50-100cm)	17474.98	0.65	207.28	1.87	9.32	1.26	6.49	9.85	0.17	0.79	42.48	1.70
S9-LB (100-150cm)	12575.99	0.70	191.63	1.96	7.86	2.71	5.74	3.19	0.10	1.63	35.15	2.40
S9-LB (150-200cm)	10230.69	1.67	171.80	1.63	5.92	3.94	5.23	7.22	0.17	1.31	27.42	1.37
S9-LB (200-250cm)	10541.69	1.94	185.87	1.99	6.38	2.66	5.14	5.41	<LOD	NA	31.39	1.49
S9-LB (250-300cm)	10566.04	2.26	164.54	1.47	6.46	1.60	5.11	16.61	<LOD	NA	29.36	2.33
S9-LC (0-5cm)	26769.74	0.42	345.38	1.94	14.09	1.55	15.35	2.22	1.97	1.03	67.38	0.80
S9-LC (5-25cm)	21092.71	0.69	317.09	1.69	12.76	2.24	13.31	3.71	0.58	1.39	60.27	0.56
S9-LC (25-50cm)	22730.64	0.59	353.95	1.11	23.64	1.49	13.30	0.81	1.98	0.48	67.10	0.18
S9-LC (50-100cm)	22760.79	0.90	314.18	0.10	15.11	1.57	11.45	5.59	3.09	2.16	72.13	2.78
S9-LC (100-150cm)	20125.93	1.34	249.70	2.08	10.36	1.61	9.55	2.42	0.82	0.79	57.98	2.16
S9-LC (150-200cm)	13161.34	0.82	211.69	0.83	7.22	3.39	7.51	3.68	1.66	0.83	45.60	0.77



ID Campo	Al		As		Ba		Cd		Cr		Cu	
	mg/kg	RSD %	mg/kg	RSD %	mg/kg	RSD %	mg/kg	RSD %	mg/kg	RSD %	mg/kg	RSD %
S9-LD (0-5cm)	30996.69	2.66	10.53	2.38	323.30	2.91	4.65	1.15	22.41	0.90	51.98	0.67
S9-LD (5-25cm)	21433.78	0.77	9.74	3.36	228.43	0.85	3.73	0.60	18.04	1.37	33.88	1.31
S9-LD (25-50cm)	23609.65	1.65	10.07	1.07	231.36	1.73	4.78	1.35	21.72	3.58	48.35	4.33
S9-LD (50-100cm)	11990.63	2.77	6.09	0.85	149.23	3.11	3.87	2.10	17.85	2.27	28.46	1.54
S9-RB (0-5cm)	29405.22	2.78	11.31	2.45	300.64	2.86	4.41	2.29	23.03	1.74	46.62	1.85
S9-RB (5-25cm)	51043.26	1.46	22.16	3.69	345.04	1.60	5.65	1.18	20.37	1.67	111.81	1.28
S9-RB (25-50cm)	7958.93	0.31	2.56	1.71	97.68	0.22	4.35	3.20	14.16	2.97	17.60	2.12
S9-RB (50-100cm)	18626.91	1.35	8.19	0.53	230.86	1.50	4.77	1.50	27.64	1.68	27.24	1.58
S9-RB (100-150cm)	8358.09	2.72	5.25	1.56	117.82	2.98	2.49	0.79	10.36	1.06	16.47	5.07
S9-RB (150-200cm)	7177.16	1.14	4.45	1.46	92.86	1.36	1.89	3.80	6.71	0.47	15.01	2.15
S9-RB (200-260cm)	13763.42	1.60	6.09	0.76	160.27	1.74	3.44	1.95	15.99	2.87	18.98	4.10
S9-RC (0-5cm)	10397.71	1.88	5.33	2.58	104.50	2.21	2.07	6.25	8.11	1.59	13.82	2.98
S9-RC (5-25cm)	22402.14	1.28	9.59	2.07	267.52	1.34	4.47	1.87	24.52	2.47	26.61	2.36
S9-RC (25-50cm)	21031.79	1.06	9.32	2.07	244.54	1.11	4.13	3.15	24.45	2.72	23.58	2.15
S9-RC (50-100cm)	13496.48	1.83	8.66	0.38	191.37	2.09	4.07	0.52	21.05	0.64	24.13	0.90
S9-RC (100-150cm)	16195.38	0.71	7.32	2.27	210.62	0.80	3.85	2.31	25.66	2.74	27.18	3.03
S9-RC (150-200cm)	10885.87	0.88	7.55	0.49	116.74	0.89	3.87	1.84	16.81	4.10	11.94	4.32
S9-RD (0-5cm)	29946.23	0.87	13.21	1.86	298.73	0.93	4.67	2.40	26.27	0.56	41.88	0.10
S9-RD (5-25cm)	17054.69	0.53	7.10	2.55	199.93	0.57	3.71	1.32	18.23	1.67	20.72	2.69
S9-RD (25-50cm)	15923.52	1.98	6.97	1.47	184.45	2.08	4.06	1.70	20.83	1.71	20.28	2.86
S9-RD (50-100cm)	8729.44	1.59	3.87	1.09	108.30	1.61	2.64	1.11	10.78	2.40	12.81	3.26

ID Campo	Fe		Mn		Ni		Pb		Sb		Zn	
	mg/kg	RSD %	mg/kg	RSD %	mg/kg	RSD %	mg/kg	RSD %	mg/kg	RSD %	mg/kg	RSD %
S9-LD (0-5cm)	26670.51	1.44	694.02	0.76	21.75	1.99	25.51	1.46	3.43	1.60	104.04	0.73
S9-LD (5-25cm)	22573.30	0.94	490.66	0.47	17.01	1.05	17.73	2.20	1.95	0.47	80.14	1.81
S9-LD (25-50cm)	24465.41	0.30	517.12	1.76	18.52	1.50	18.24	5.64	3.27	2.41	86.89	2.84
S9-LD (50-100cm)	23048.49	0.74	298.85	0.75	13.49	1.21	11.74	2.26	4.02	1.21	62.56	1.71
S9-RB (0-5cm)	24312.17	0.71	660.53	0.27	26.02	2.91	21.98	2.22	2.24	0.37	93.24	1.31
S9-RB (5-25cm)	30987.13	0.88	1443.64	1.23	28.77	0.78	46.33	0.77	1.48	1.04	150.74	1.43
S9-RB (25-50cm)	27656.88	0.57	297.89	0.43	10.06	1.67	12.66	2.95	0.84	0.49	47.76	2.41
S9-RB (50-100cm)	28477.46	1.10	394.68	1.88	19.79	1.16	15.48	3.30	1.55	1.24	81.44	1.13
S9-RB (100-150cm)	16440.43	0.33	232.59	1.30	9.41	3.58	10.67	6.39	2.15	0.88	44.48	2.21
S9-RB (150-200cm)	13312.82	1.96	156.92	1.67	7.55	4.07	7.59	4.97	1.29	1.15	48.65	0.41



**Laboratorio Nacional de Geoquímica y Minerología
Universidad Nacional Autónoma de México
Geoquímica Ambiental**



ID Campo	Fe		Mn		Ni		Pb		Sb		Zn	
	mg/kg	RSD %	mg/kg	RSD %	mg/kg	RSD %	mg/kg	RSD %	mg/kg	RSD %	mg/kg	RSD %
S9-RB (200-260cm)	21820.74	0.84	335.19	1.35	13.24	1.24	11.76	11.28	2.12	1.88	77.94	2.90
S9-RC (0-5cm)	14283.39	0.98	156.71	1.82	8.50	1.63	12.83	5.72	1.61	0.76	46.42	0.71
S9-RC (5-25cm)	26007.27	0.55	494.00	0.34	19.04	1.15	17.46	2.76	2.36	2.21	82.01	2.51
S9-RC (25-50cm)	25038.18	0.71	463.30	0.66	19.59	1.11	17.12	3.64	0.99	0.90	82.14	1.86
S9-RC (50-100cm)	24945.22	0.52	365.42	0.24	16.77	1.52	13.95	3.23	1.69	1.65	91.59	0.68
S9-RC (100-150cm)	23578.74	0.62	495.24	0.27	25.28	0.34	16.49	7.66	2.19	1.76	88.63	2.25
S9-RC (150-200cm)	25035.18	0.95	320.56	0.99	12.65	0.65	14.52	6.24	2.55	1.07	55.48	4.43
S9-RD (0-5cm)	26601.30	0.95	680.95	1.58	23.37	1.19	25.87	3.59	0.65	2.05	104.40	0.42
S9-RD (5-25cm)	23171.90	0.53	377.70	1.20	15.72	1.86	12.51	8.60	2.03	1.47	73.64	2.18
S9-RD (25-50cm)	25130.86	1.11	392.42	0.35	16.49	0.37	14.08	7.56	2.76	1.11	98.29	1.41
S9-RD (50-100cm)	17849.65	1.65	236.43	0.68	9.98	4.77	19.95	2.19	1.33	1.41	47.20	3.11

CONTROL DE CALIDAD

En el caso de los análisis determinados por ICP-OES la concentración de cada elemento fue determinada por triplicado, el valor reportado es el promedio de las tres determinaciones reportando también la desviación estándar relativa (RSD) de las mediciones.

Para determinar la exactitud se utilizaron estándares de control analítico de concentraciones conocidas (5 y 50 ppm) los cuales fueron analizados como muestra para determinar su concentración por medio de curvas de calibración preparadas, indicando un buen desempeño del método de análisis.

% exactitud	Al	As	Ba	Cd	Cr	Cu	Fe	Mn	Ni	Pb	Sb	Zn
50 ppm	102.22	94.43	104.70	92.82	96.91	102.49	99.57	98.05	92.13	98.13	95.71	92.63
5 ppm	100.42	102.39	104.25	108.92	103.41	94.37	105.81	107.11	109.38	109.66	102.16	108.74

Sin mas por al momento quedo a sus ordenes.

Analista:

QFB. Fabiola Vega García

QA. Daniel Ramos Pérez

M en C Alicia Santana Silva

Responsable tecnico: M en C Luis Gerardo Martínez Jardines



INFORME DE RESULTADOS ICP-OES
MOLINITO

Datos del solicitante:

Dr. Francisco Martín Romero correo electrónico: fmrch@geologia.unam.mx, fmrch@hotmail.com

Dirección: Instituto de Geología, UNAM. Teléfono: 56224386 ext 129

Información de las muestras:

Fecha de recepción de muestras: 13 de julio del 2015

Se analizaron 129 muestras de suelos del Molinito.
 Las muestras se recibieron en bolsas de plástico de 25X10 cm.

Información de los análisis

En las 129 muestras se determinaron elementos traza por Espectrometría de Emisión Óptica con Plasma Inductivamente Acoplado (ICP-OES) en un equipo Pekín Elmer serie 8300.

Las muestras fueron digeridas por el método EPA 3051, los resultados se reportan en mg/kg.

Modo de inyección : Cámara ciclónica.

Límites de detección :

Los límites considerados son para modo de inyección cámara ciclónica y están reportados en mg/L.

LD mg/L	Al	As	Ba	Cd	Cr	Cu	Fe	Mn	Ni	Pb	Sb	Zn
	0.08	0.07	0.01	0.02	0.003	0.122	0.01	0.007	0.01	0.03	0.1	0.007

Lista de muestras:

ID Campo	coordenadas		ID Campo	coordenadas		ID Campo	coordenadas	
	X	Y		X	Y		X	Y
M1-A (5cm)	531984	3237820	M1-RB (5cm)	532034	3237804	M2-LB (50cm)	531953	3236547
M1-A (25cm)	531984	3237820	M1-RB (25cm)	532034	3237804	M2-RB (5cm)	531944	3236498
M1-A (50cm)	531984	3237820	M1-RB (50cm)	532034	3237804	M2-RB (25cm)	531944	3236498
M1-LB (5cm)	531921	3237854	M2-A (5cm)	531965	3236515	M2-RB (50cm)	531944	3236498
M1-LB (25cm)	531921	3237854	M2-A (25cm)	531965	3236515	M3-A (5cm)	528349	3237112
M1-LB (50cm)	531921	3237854	M2-LB (5cm)	531953	3236547	M3-A (25cm)	528349	3237112
M1-LB Roca	531921	3237854	M2-LB (25cm)	531953	3236547	M3-A (50cm)	528349	3237112



Laboratorio Nacional de Geoquímica y Minerología
Universidad Nacional Autónoma de México
Geoquímica Ambiental



ID Campo	coordenadas		ID Campo	coordenadas		ID Campo	coordenadas	
	X	Y		X	Y		X	Y
M3-LB (5cm)	528303	3237112	M9-A (50cm)	530111	3232025	M13-A (40cm)	533160	3231224
M3-LB (25cm)	528303	3237112	M9-LB (5cm)	530117	3232020	M13-LB (5cm)	533160	3231224
M3-LB (50cm)	528303	3237112	M9-LB (25cm)	530117	3232020	M13-LB (25cm)	533160	3231224
M3-RB(5cm)	528360	3237124	M9-LB (50cm)	530117	3232020	M13-LB (50cm)	533160	3231224
M3-RB (25cm)	528360	3237124	M9-RB (5cm)	530109	3232032	M13-RB (5cm)	533160	3231224
M3-RB (50cm)	528360	3237124	M9-RB (25cm)	530109	3232032	M13-RB (25cm)	533160	3231224
M4-A (5cm)	528726	3236470	M9-RB (50cm)	530109	3232032	M13-RB (50cm)	533160	3231224
M4-A (25cm)	528726	3236470	M10-A (5cm)	530132	3232330	M14-A (5cm)	530957	3232595
M4-A (50cm)	528726	3236470	M10-A (25cm)	530132	3232330	M14-A (25cm)	530957	3232595
M4-A (100cm)	528726	3236470	M10-A (50cm)	530132	3232330	M14-A (40cm)	530957	3232595
M4-LB (5cm)	528690	3236469	M10-LB (5cm)	530143	3232319	M14-LB (5cm)	530970	3232602
M4-LB (25cm)	528690	3236469	M10-LB (25cm)	530143	3232319	M14-LB (25cm)	530970	3232602
M4-LB (50cm)	528690	3236469	M10-LB (50cm)	530143	3232319	M14-LB (50cm)	530970	3232602
M4-RB (5cm)	528731	3236468	M10-RB(5cm)	530103	3232339	M14-RB (5cm)	530939	3232589
M4-RB (25cm)	528731	3236468	M10-RB (25cm)	530103	3232339	M14-RB (25cm)	530939	3232589
M4-RB (50cm)	528731	3236468	M10-RB (50cm)	530103	3232339	M14-RB (50cm)	530939	3232589
M7-A (5cm)	529706	3232296	M11-A (5cm)	530117	3232020	M15-A (0-5cm)	534135	3231658
M7-A (25cm)	529706	3232296	M11-A (25cm)	530117	3232020	M15-A (5-25cm)	534135	3231658
M7-A (40cm)	529706	3232296	M11-A (50cm)	530117	3232020	M15-A (25-50cm)	534135	3231658
M7-LB (5cm)	529716	3232290	M11-LB (5cm)	530704	3231898	M15-A (+50cm)	534135	3231658
M7-LB (25cm)	529716	3232290	M11-LB (25cm)	530704	3231898	M15-A (roca)	534136	3231657
M7-LB (40cm)	529716	3232290	M11-LB (50cm)	530704	3231898	M15-LB (0-5cm)	534143	3231662
M7-RB (5cm)	529712	3232356	M11-RB (5cm)	530704	3231898	M15-LB (5-25cm)	534143	3231662
M7-RB (25cm)	529712	3232356	M11-RB (25cm)	530704	3231898	M15-LB (25-50cm)	534143	3231662
M7-RB (60cm)	529712	3232356	M11-RB (50cm)	530704	3231898	M15-RB (0-5cm)	534125	3231653
M8-A (5cm)	530002	3232540	M12-A (5cm)	530220	3232492	M15-RB (5-25cm)	534125	3231653
M8-A (25cm)	530002	3232540	M12-A (25cm)	530220	3232492	M15-RB (25-50cm)	534125	3231653
M8-A (50cm)	530002	3232540	M12-A (50cm)	530220	3232492	M16-A (0-5cm)	532551	3232832
M8-LB (5cm)	530008	3232526	M12-LB (5cm)	530220	3232492	M16-A (5-25cm)	532551	3232832
M8-LB (25cm)	530008	3232526	M12-LB (25cm)	530220	3232492	M16-A (25-50cm)	532551	3232832
M8-LB (50cm)	530008	3232526	M12-LB (50cm)	530220	3232492	M16-LB (0-5cm)	532567	3232835
M8-RB (5cm)	529996	3232546	M12-RB (5cm)	530198	3232495	M16-LB (5-25cm)	532567	3232835
M8-RB (25cm)	529996	3232546	M12-RB (25cm)	530198	3232495	M16-LB (25-50cm)	532567	3232835
M8-RB (50cm)	529996	3232546	M12-RB (50cm)	530198	3232495	M16-RB (0-5cm)	532543	3232824
M9-A (5cm)	530111	3232025	M13-A (5cm)	533160	3231224	M16-RB (5-cm)	532543	3232824
M9-A (25cm)	530111	3232025	M13-A (25cm)	533160	3231224	M16-RB (25-50cm)	532543	3232824



Laboratorio Nacional de Geoquímica y Minerología
Universidad Nacional Autónoma de México
Geoquímica Ambiental



Resultados:

ID Campo	Al		As		Ba		Cd		Cr		Cu	
	mg/kg	RSD %	mg/kg	RSD %	mg/kg	RSD %	mg/kg	RSD %	mg/kg	RSD %	mg/kg	RSD %
M1-A (5cm)	17667.81	2.92	8.81	5.31	255.61	3.24	2.78	1.30	18.67	2.75	10.22	3.89
M1-A (25cm)	16676.24	3.82	7.56	2.84	246.85	4.02	2.60	1.79	18.25	2.80	9.88	3.87
M1-A (50cm)	22343.67	1.73	10.11	4.94	289.73	1.84	3.42	2.49	30.00	3.63	13.10	2.74
M1-LB (5cm)	17014.68	2.21	<LOD	NA	176.03	2.39	4.75	3.58	23.06	1.42	7.42	4.00
M1-LB (25cm)	27782.61	1.22	<LOD	NA	263.11	1.35	3.78	2.12	23.21	3.31	11.92	2.23
M1-LB (50cm)	20309.22	0.86	<LOD	NA	242.55	0.95	3.94	1.42	21.77	0.82	11.14	2.39
M1-LB Roca	11221.98	4.00	<LOD	NA	261.54	4.10	1.69	0.67	8.86	0.47	17.05	0.67
M1-RB (5cm)	25069.08	0.87	<LOD	NA	201.60	0.97	3.86	1.67	28.49	2.42	10.00	3.39
M1-RB (25cm)	24894.61	1.51	<LOD	NA	174.99	1.58	3.32	3.78	20.45	2.91	7.54	4.21
M1-RB (50cm)	25383.32	1.31	<LOD	NA	199.70	1.39	3.52	2.68	23.87	2.11	10.27	1.07
M2-A (5cm)	46694.43	2.85	10.84	1.85	741.30	2.98	4.56	5.73	39.16	3.30	24.01	4.40
M2-A (25cm)	27576.46	4.95	11.25	3.82	532.46	5.16	3.41	1.53	28.65	2.19	12.33	2.12
M2-LB (5cm)	22713.50	1.50	7.98	6.65	262.59	1.71	3.66	3.96	34.68	4.52	13.71	6.21
M2-LB (25cm)	17665.10	2.95	7.29	9.12	264.34	3.06	3.18	2.98	34.99	4.73	5.68	9.98
M2-LB (50cm)	23688.71	2.91	8.58	7.43	305.23	3.06	3.74	9.04	41.86	6.23	12.82	7.80
M2-RB (5cm)	27122.47	1.78	5.85	9.45	271.92	1.79	4.14	0.83	39.72	2.25	18.80	2.01
M2-RB (25cm)	28598.85	1.08	6.72	3.31	277.25	0.89	4.84	3.22	45.02	3.95	49.22	9.42
M2-RB (50cm)	30045.27	1.99	7.13	0.82	331.20	1.78	4.22	1.69	39.12	1.92	33.24	3.88
M3-A (5cm)	10968.69	1.57	3.61	0.47	159.37	1.99	1.78	1.73	9.64	1.31	19.11	3.16
M3-A (25cm)	12923.39	5.11	3.62	2.42	159.59	5.19	2.18	4.26	12.08	2.12	22.81	3.81
M3-A (50cm)	13557.77	2.05	4.50	2.91	169.27	2.06	1.94	2.49	11.17	5.19	14.94	4.06
M3-LB (5cm)	34583.08	0.75	2.69	2.11	270.33	0.81	4.70	2.94	29.64	3.17	318.64	7.24
M3-LB (25cm)	41484.66	3.03	2.91	3.30	330.98	3.25	4.11	0.93	26.74	1.04	161.45	4.22
M3-LB (50cm)	40623.93	0.96	2.85	2.19	297.96	0.97	4.50	0.27	27.09	1.81	142.63	2.63
M3-RB(5cm)	25987.05	2.06	2.23	4.52	219.37	2.34	3.81	2.68	27.87	2.72	137.35	2.17
M3-RB (25cm)	22640.08	2.52	2.28	4.73	193.60	2.74	3.66	2.04	21.18	1.29	74.21	1.93
M3-RB (50cm)	36663.54	0.99	5.52	6.23	246.68	1.02	4.12	1.66	26.27	2.03	84.34	3.02
M4-A (5cm)	8442.13	1.26	4.20	2.25	125.29	1.46	3.09	2.35	14.36	0.67	49.71	0.94
M4-A (25cm)	16200.54	0.90	3.81	3.95	199.76	0.82	3.07	3.75	16.16	1.78	51.17	2.30
M4-A (50cm)	24115.54	1.36	5.90	1.92	200.98	1.38	2.93	1.64	16.13	2.24	39.01	3.34
M4-A (100cm)	15804.90	1.73	4.26	1.31	159.77	1.74	2.10	4.34	13.31	1.55	34.76	0.48
M4-LB (5cm)	14131.80	0.53	4.74	2.12	173.21	0.57	2.53	4.37	14.36	4.15	32.04	3.20
M4-LB (25cm)	12635.05	1.54	4.68	5.19	153.33	1.69	2.29	5.34	14.56	1.60	26.67	1.15
M4-LB (50cm)	18217.35	0.75	4.16	3.17	187.04	0.83	3.19	2.63	20.43	2.18	31.31	1.50



Laboratorio Nacional de Geoquímica y Minerología
Universidad Nacional Autónoma de México
Geoquímica Ambiental



ID Campo	Fe		Mn		Ni		Pb		Sb		Zn	
	mg/kg	RSD %	mg/kg	RSD %	mg/kg	RSD %	mg/kg	RSD %	mg/kg	RSD %	mg/kg	RSD %
M1-A (5cm)	17636.53	4.10	464.93	2.16	18.02	2.63	12.52	6.03	<LOD	NA	54.56	2.05
M1-A (25cm)	17379.75	4.78	452.21	2.00	17.64	2.10	12.96	1.56	<LOD	NA	51.54	2.51
M1-A (50cm)	20854.37	2.03	592.49	1.44	26.89	2.70	16.85	3.18	<LOD	NA	71.67	3.27
M1-LB (5cm)	32145.45	2.71	573.19	1.61	19.04	2.89	6.67	8.49	<LOD	NA	58.16	1.36
M1-LB (25cm)	26172.25	1.47	464.67	1.50	18.32	1.38	4.83	1.90	<LOD	NA	65.45	3.15
M1-LB (50cm)	24968.56	1.36	401.48	2.46	16.31	1.14	4.80	8.03	<LOD	NA	51.84	1.48
M1-LB Roca	10487.34	4.34	117.37	0.93	6.87	1.48	<LOD	NA	<LOD	NA	34.97	1.48
M1-RB (5cm)	24520.38	1.17	429.56	1.02	22.33	0.80	13.44	2.97	<LOD	NA	68.25	2.69
M1-RB (25cm)	25227.16	1.87	423.32	2.04	17.47	0.53	5.63	10.06	<LOD	NA	64.50	2.14
M1-RB (50cm)	25209.79	1.73	490.86	2.61	20.63	3.77	6.81	10.73	<LOD	NA	65.22	1.68
M2-A (5cm)	29459.20	3.36	673.93	0.33	29.84	1.26	10.66	11.37	3.52	27.19	84.55	3.71
M2-A (25cm)	21537.98	6.16	482.04	2.17	21.23	0.41	10.28	3.52	<LOD	NA	60.08	1.50
M2-LB (5cm)	23011.31	2.19	506.55	1.19	25.75	2.74	19.65	3.70	<LOD	NA	74.27	4.67
M2-LB (25cm)	22321.81	3.27	479.16	2.64	24.93	0.84	18.54	3.22	<LOD	NA	51.32	4.98
M2-LB (50cm)	25779.15	3.35	509.27	2.05	27.78	2.65	16.81	1.71	<LOD	NA	66.77	6.29
M2-RB (5cm)	27914.64	1.94	469.52	1.55	21.47	2.84	20.65	3.86	3.60	9.05	79.92	1.82
M2-RB (25cm)	31275.79	0.41	428.20	1.46	27.49	1.31	14.30	1.44	<LOD	NA	65.05	3.93
M2-RB (50cm)	23645.94	1.51	388.62	1.50	25.12	0.63	12.19	5.69	<LOD	NA	63.64	1.74
M3-A (5cm)	11853.45	2.60	240.98	1.43	8.03	1.49	9.76	2.92	<LOD	NA	31.53	1.30
M3-A (25cm)	12813.18	5.49	303.67	2.08	10.24	2.27	11.52	5.58	<LOD	NA	36.69	0.83
M3-A (50cm)	12934.37	2.20	268.78	2.07	9.40	0.88	10.39	3.05	<LOD	NA	38.07	4.59
M3-LB (5cm)	25683.90	0.81	633.87	1.82	28.97	1.91	15.92	6.39	0.64	10.29	96.43	2.70
M3-LB (25cm)	24190.66	1.09	675.08	0.30	32.51	1.11	14.40	3.81	0.46	6.84	111.32	0.47
M3-LB (50cm)	26088.82	0.90	719.23	1.86	32.43	1.86	15.75	5.74	1.74	7.85	83.22	1.57
M3-RB (5cm)	22799.98	1.00	534.46	1.27	21.88	1.23	15.88	6.27	1.81	9.67	83.72	2.25
M3-RB (25cm)	22585.05	1.19	490.74	0.75	18.06	0.63	15.59	1.11	<LOD	NA	68.94	1.87
M3-RB (50cm)	25623.85	0.37	641.76	2.43	22.96	2.25	19.27	0.42	<LOD	NA	91.35	1.31
M4-A (5cm)	20193.82	1.74	320.87	0.64	10.41	1.14	11.88	2.39	<LOD	NA	46.06	0.80
M4-A (25cm)	19787.39	0.66	355.54	1.16	12.80	0.27	13.91	3.08	3.17	1.08	52.21	1.62
M4-A (50cm)	18647.43	2.43	433.71	1.58	15.04	2.49	16.14	7.63	1.25	6.61	60.75	4.20
M4-A (100cm)	14612.53	0.69	331.92	0.75	12.68	0.96	13.80	2.88	1.57	6.62	45.78	1.15
M4-LB (5cm)	17112.59	3.39	339.47	2.54	12.35	3.55	11.65	2.52	2.33	1.52	49.50	3.81
M4-LB (25cm)	15515.66	1.05	310.55	1.44	12.06	1.59	11.80	6.78	0.69	2.49	43.45	0.30
M4-LB (50cm)	20205.63	0.82	396.48	1.53	14.98	3.28	13.68	3.89	1.15	1.25	54.11	1.47



Laboratorio Nacional de Geoquímica y Minerología
Universidad Nacional Autónoma de México
Geoquímica Ambiental



ID Campo	Al		As		Ba		Cd		Cr		Cu	
	mg/kg	RSD %	mg/kg	RSD %	mg/kg	RSD %	mg/kg	RSD %	mg/kg	RSD %	mg/kg	RSD %
M4-RB (5cm)	25535.26	0.35	5.81	1.04	231.26	0.41	3.72	3.49	23.25	0.62	43.51	0.43
M4-RB (25cm)	30593.10	1.38	4.93	1.81	244.29	1.58	4.14	1.58	25.83	2.13	41.16	0.52
M4-RB (50cm)	35310.99	1.34	7.28	2.72	261.25	1.39	4.42	1.39	30.92	1.23	48.53	1.36
M7-A (5cm)	31626.32	6.61	21.26	1.29	158.53	6.98	4.41	1.67	28.64	0.71	7.88	2.15
M7-A (25cm)	40236.93	2.86	26.48	2.03	236.53	2.94	4.54	1.30	30.38	1.03	13.54	1.53
M7-A (40cm)	39479.88	2.79	29.48	0.67	214.38	2.97	4.27	1.45	26.90	1.15	12.34	0.99
M7-LB (5cm)	42677.55	0.76	36.01	1.78	190.31	0.51	5.69	0.60	25.28	3.09	29.27	0.79
M7-LB (25cm)	44642.68	2.05	40.08	2.24	186.82	0.72	5.17	2.13	38.26	1.59	29.82	2.55
M7-LB (40cm)	49323.20	0.35	43.12	1.55	206.10	0.68	4.70	1.22	30.31	1.10	25.09	2.57
M7-RB (5cm)	26205.05	0.60	29.94	4.15	193.27	0.51	4.13	2.36	19.56	4.10	10.34	3.40
M7-RB (25cm)	22902.65	2.18	44.52	1.60	210.88	2.14	4.26	4.94	18.17	1.12	10.45	10.07
M7-RB (60cm)	35157.19	3.99	42.72	2.18	244.77	4.10	3.81	3.79	18.79	0.59	6.81	1.66
M8-A (5cm)	30532.17	1.95	29.34	0.62	232.87	2.10	3.80	3.39	19.48	2.56	12.48	2.16
M8-A (25cm)	27573.37	3.61	48.60	2.13	227.84	3.68	4.24	4.66	19.92	4.63	11.07	6.73
M8-A (50cm)	34291.24	1.57	31.02	1.23	255.14	1.55	4.25	0.88	23.82	1.58	10.87	2.11
M8-LB (5cm)	46626.01	3.15	19.57	0.71	174.56	3.30	4.77	2.91	36.33	3.43	9.98	4.46
M8-LB (25cm)	35779.08	2.48	26.11	1.03	144.90	2.57	4.52	2.01	26.74	2.87	10.61	2.59
M8-LB (50cm)	46894.23	3.11	24.98	1.15	245.27	3.17	4.92	2.05	36.00	1.29	14.78	0.58
M8-RB (5cm)	28071.76	1.22	54.36	3.09	214.94	1.23	4.66	0.88	32.07	0.91	12.50	2.09
M8-RB (25cm)	21991.52	1.17	59.16	1.26	177.28	0.95	4.69	0.56	27.51	1.00	11.60	3.28
M8-RB (50cm)	25040.89	0.55	64.88	3.18	210.48	1.83	5.35	1.85	35.68	2.50	13.33	2.63
M9-A (5cm)	28250.71	1.61	64.73	3.59	135.19	1.75	3.95	3.33	20.66	1.45	4.70	2.37
M9-A (25cm)	19790.41	1.74	249.32	1.42	108.02	1.68	8.53	3.47	37.04	3.33	7.67	5.95
M9-A (50cm)	21360.72	0.83	240.20	0.84	97.05	0.97	5.25	1.62	23.91	0.76	20.33	3.30
M9-LB (5cm)	25697.77	1.77	137.69	0.85	127.90	1.86	4.38	1.79	32.81	1.22	5.11	1.56
M9-LB (25cm)	25850.18	1.81	90.25	2.44	124.76	1.90	3.57	5.33	17.44	2.41	5.53	8.14
M9-LB (50cm)	28909.33	1.50	114.86	2.15	130.24	1.57	3.56	2.13	15.33	3.61	5.30	6.39
M9-RB (5cm)	34634.16	0.10	42.16	5.11	157.61	0.12	4.11	1.97	26.25	3.27	11.38	3.67
M9-RB (25cm)	33125.74	1.82	45.50	5.42	153.95	1.92	3.88	3.13	22.52	1.21	7.98	3.60
M9-RB (50cm)	27678.42	0.57	73.50	2.07	121.57	0.72	3.38	1.42	23.54	2.48	3.74	5.24
M10-A (5cm)	15603.82	2.21	415.75	1.33	85.45	2.32	3.70	4.20	19.51	3.85	4.51	12.67
M10-A (25cm)	20093.32	1.97	171.24	4.16	116.96	2.19	5.91	2.02	26.87	2.73	4.45	4.75
M10-A (50cm)	42244.40	0.59	81.58	1.07	185.29	0.64	4.37	2.70	26.11	1.04	11.54	1.69
M10-LB (5cm)	34756.30	1.47	59.62	2.78	159.03	1.52	5.25	2.30	40.71	1.81	9.64	2.45
M10-LB (25cm)	27974.99	4.49	64.43	2.95	133.82	4.66	4.07	1.84	21.44	2.78	5.05	4.14
M10-LB (50cm)	39501.63	1.07	66.14	2.27	123.54	3.78	<LOD	NA	28.64	1.89	45.47	0.34



ID Campo	Fe		Mn		Ni		Pb		Sb		Zn	
	mg/kg	RSD %	mg/kg	RSD %	mg/kg	RSD %	mg/kg	RSD %	mg/kg	RSD %	mg/kg	RSD %
M4-RB (5cm)	22421.27	0.53	527.91	1.74	20.32	0.70	18.31	4.65	1.26	7.87	73.01	0.26
M4-RB (25cm)	24153.56	0.19	544.51	0.98	21.52	1.34	20.16	3.35	<LOD	6.02	82.86	1.68
M4-RB (50cm)	26164.95	0.46	690.00	1.46	30.80	0.73	19.20	3.74	1.31	3.54	83.10	1.66
M7-A (5cm)	32036.20	8.02	455.59	1.77	16.30	0.16	16.21	1.23	<LOD	NA	59.47	0.69
M7-A (25cm)	32542.29	3.18	601.02	1.40	26.69	1.18	18.54	1.37	<LOD	NA	69.06	1.51
M7-A (40cm)	28738.86	3.45	590.44	2.04	26.09	1.17	18.17	2.25	<LOD	NA	78.67	1.05
M7-LB (5cm)	33537.78	1.47	534.07	1.43	16.67	0.43	29.90	1.15	<LOD	NA	88.74	3.01
M7-LB (25cm)	36091.57	2.03	512.06	1.81	23.09	1.13	30.05	3.36	<LOD	NA	78.00	1.62
M7-LB (40cm)	36068.24	0.87	532.73	0.79	18.60	1.03	28.56	0.79	<LOD	NA	80.38	1.10
M7-RB (5cm)	28380.56	0.33	457.37	3.06	14.75	2.95	20.47	3.26	<LOD	NA	70.25	3.98
M7-RB (25cm)	30357.61	2.34	637.28	0.89	16.19	1.04	38.00	2.63	<LOD	NA	79.59	1.92
M7-RB (60cm)	28581.77	4.67	510.45	0.18	18.27	1.50	16.99	0.89	<LOD	NA	81.32	0.19
M8-A (5cm)	27124.35	2.66	466.33	1.49	14.69	0.47	20.78	4.90	<LOD	NA	68.13	1.71
M8-A (25cm)	30818.72	3.97	618.62	0.93	15.44	1.67	48.85	0.93	<LOD	NA	73.29	4.32
M8-A (50cm)	29358.65	1.42	556.75	0.66	18.81	1.32	18.27	2.03	<LOD	NA	76.24	1.50
M8-LB (5cm)	34210.04	3.72	456.00	0.42	18.46	0.53	14.84	4.79	<LOD	NA	63.85	3.50
M8-LB (25cm)	32679.07	2.68	454.21	0.95	15.55	2.56	18.62	3.50	<LOD	NA	65.91	2.56
M8-LB (50cm)	35153.68	3.62	682.68	0.88	22.04	2.37	23.66	2.81	<LOD	NA	76.29	1.00
M8-RB (5cm)	34706.84	2.13	607.53	2.22	23.36	0.93	32.16	2.34	<LOD	NA	85.36	1.83
M8-RB (25cm)	33673.08	0.66	588.08	0.70	22.88	0.58	34.44	4.03	<LOD	NA	82.94	1.33
M8-RB (50cm)	41349.56	0.28	726.21	0.23	25.68	0.26	34.93	1.65	<LOD	NA	96.98	1.89
M9-A (5cm)	28797.23	1.96	389.51	1.94	16.54	1.91	13.31	1.31	<LOD	NA	53.51	1.72
M9-A (25cm)	62930.15	1.82	611.06	3.48	27.14	3.32	41.53	1.08	<LOD	NA	93.28	3.54
M9-A (50cm)	38055.04	1.07	511.69	0.41	21.52	0.58	32.98	1.86	<LOD	NA	65.95	0.98
M9-LB (5cm)	31967.04	2.25	515.13	1.16	18.32	0.35	16.87	2.31	<LOD	NA	64.73	1.38
M9-LB (25cm)	25172.93	1.97	492.24	0.70	18.64	0.79	14.56	2.65	<LOD	NA	70.34	2.81
M9-LB (50cm)	26003.06	1.71	469.42	1.16	19.25	0.31	14.26	3.46	<LOD	NA	72.75	3.31
M9-RB (5cm)	28017.41	0.41	447.67	1.85	16.41	0.81	15.84	3.33	<LOD	NA	67.98	3.64
M9-RB (25cm)	28019.42	2.49	436.15	0.28	18.20	1.42	14.03	1.89	<LOD	NA	55.32	1.26
M9-RB (50cm)	25840.85	0.73	403.34	1.13	19.36	0.46	10.85	5.18	<LOD	NA	47.49	2.43
M10-A (5cm)	27278.95	2.53	428.15	2.38	13.69	1.95	17.94	2.03	<LOD	NA	50.84	3.63
M10-A (25cm)	43081.91	2.84	509.87	2.09	19.05	2.56	31.06	3.86	<LOD	NA	64.82	2.31
M10-A (50cm)	30156.91	0.94	546.08	2.66	17.22	1.04	14.13	2.87	<LOD	NA	67.33	0.69
M10-LB (5cm)	36892.99	1.81	548.68	2.76	24.04	1.37	17.22	3.97	<LOD	NA	75.28	2.36
M10-LB (25cm)	28518.82	5.25	394.44	2.92	16.32	1.11	12.85	3.58	<LOD	NA	55.11	3.16
M10-LB (50cm)	50908.41	0.77	305.92	0.56	14.99	2.18	14.45	1.41	14.97	3.30	84.51	65.24



Laboratorio Nacional de Geoquímica y Minerología
Universidad Nacional Autónoma de México
Geoquímica Ambiental



ID Campo	Al		As		Ba		Cd		Cr		Cu	
	mg/kg	RSD %	mg/kg	RSD %	mg/kg	RSD %	mg/kg	RSD %	mg/kg	RSD %	mg/kg	RSD %
M10-RB(5cm)	41767.15	3.51	32.70	4.85	146.35	3.52	4.41	2.66	25.24	2.38	9.17	2.24
M10-RB (25cm)	39504.07	1.99	74.55	2.17	149.69	2.14	3.93	2.22	19.41	2.19	9.45	3.49
M10-RB (50cm)	48394.47	3.37	28.60	4.47	188.33	3.40	4.16	4.63	26.62	3.60	10.37	5.55
M11-A (5cm)	26703.04	0.12	41.77	6.31	176.54	2.67	<LOD	NA	41.18	0.33	46.12	0.68
M11-A (25cm)	25662.89	1.03	38.85	5.41	167.76	1.87	<LOD	NA	41.24	0.53	45.82	0.47
M11-A (50cm)	31401.15	1.77	34.79	3.99	145.13	0.50	5.35	4.40	47.25	1.72	27.03	1.66
M11-LB (5cm)	32929.56	1.29	32.19	3.37	160.67	0.52	5.84	4.19	57.95	2.09	24.86	1.76
M11-LB (25cm)	35462.94	1.93	30.13	1.38	159.93	0.57	4.64	2.72	49.78	0.62	20.50	2.35
M11-LB (50cm)	34638.13	2.19	25.25	2.59	147.29	0.49	4.62	3.72	46.62	2.36	20.80	1.32
M11-RB (5cm)	30271.65	1.43	27.48	5.30	151.83	0.57	4.44	3.56	41.25	0.94	20.31	2.41
M11-RB (25cm)	35605.28	2.37	29.98	1.70	166.81	0.54	4.24	3.28	42.26	2.36	19.18	2.17
M11-RB (50cm)	36342.90	1.09	29.76	7.31	155.52	0.81	4.89	3.01	45.27	1.53	20.27	1.97
M12-A (5cm)	19793.33	1.36	25.04	7.53	103.74	0.24	4.23	1.87	67.64	1.70	16.18	1.72
M12-A (25cm)	24198.59	1.31	19.79	6.02	122.91	1.58	8.78	2.30	79.52	0.99	23.20	2.67
M12-A (50cm)	17756.26	2.99	111.49	2.01	98.95	3.07	3.24	1.88	12.26	2.27	4.06	5.64
M12-LB (5cm)	29362.19	2.68	24.59	7.46	172.63	2.76	4.42	2.48	33.33	1.60	11.84	2.59
M12-LB (25cm)	37514.54	3.57	20.70	7.22	179.93	3.66	4.15	1.68	32.79	2.59	13.72	3.48
M12-LB (50cm)	45523.84	2.49	43.81	5.12	176.99	2.56	<LOD	NA	35.25	0.45	50.42	0.99
M12-RB (5cm)	22623.94	0.80	55.68	4.68	112.41	1.05	3.66	5.15	21.28	3.74	11.91	8.14
M12-RB (25cm)	28285.25	2.08	77.85	1.72	152.19	0.72	3.71	3.55	23.48	2.35	14.81	2.49
M12-RB (50cm)	29905.87	1.21	79.71	1.01	149.36	0.82	3.80	1.18	24.47	3.02	17.86	5.13
M13-A (5cm)	13119.09	1.79	<LOD	NA	73.12	1.89	5.40	2.68	90.48	2.64	12.09	3.30
M13-A (25cm)	14329.80	2.41	<LOD	NA	81.20	2.41	4.70	2.42	61.68	3.00	12.11	4.32
M13-A (40cm)	15570.29	2.87	<LOD	NA	79.23	2.95	4.92	1.61	61.80	2.50	13.99	2.68
M13-LB (5cm)	31505.36	2.51	<LOD	NA	104.56	2.55	8.23	0.99	123.86	1.70	18.23	1.31
M13-LB (25cm)	34464.16	2.38	<LOD	NA	114.81	2.39	8.35	1.98	129.88	2.85	20.87	3.36
M13-LB (50cm)	41477.72	1.59	<LOD	NA	116.25	1.69	7.47	1.90	101.97	4.05	19.38	5.59
M13-RB (5cm)	18834.23	2.30	<LOD	NA	75.68	2.30	6.36	3.68	121.79	2.77	16.40	6.98
M13-RB (25cm)	28295.67	4.16	<LOD	NA	102.16	4.24	7.57	2.10	135.19	1.58	22.10	2.72
M13-RB (50cm)	27441.58	3.05	<LOD	NA	98.12	3.23	7.34	3.17	113.64	1.81	20.55	2.07
M14-A (5cm)	20364.30	1.37	35.26	3.84	102.56	3.65	<LOD	NA	62.27	1.24	47.19	0.84
M14-A (25cm)	23151.78	0.80	34.71	5.02	99.54	2.75	<LOD	NA	67.50	0.43	55.77	0.68
M14-A (40cm)	28336.44	1.29	23.24	3.62	128.98	1.56	<LOD	NA	67.82	0.86	56.63	0.82



Laboratorio Nacional de Geoquímica y Minerología
Universidad Nacional Autónoma de México
Geoquímica Ambiental



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M10-RB(5cm)	31452.43	3.87	385.80	1.38	16.12	1.54	14.57	3.58	<LOD	NA	61.74	1.91
M10-RB (25cm)	29308.38	2.42	402.21	2.21	14.79	0.38	16.18	3.03	<LOD	NA	55.83	2.54
M10-RB (50cm)	30630.58	3.68	424.08	1.97	18.27	1.62	11.43	6.08	<LOD	NA	61.03	3.95
M11-A (5cm)	52935.89	0.93	630.30	1.22	28.36	1.98	3.44	6.63	14.56	7.81	82.87	48.97
M11-A (25cm)	53518.13	0.29	658.95	15.10	28.43	1.33	3.83	9.72	15.18	11.08	44.52	1.40
M11-A (50cm)	41108.97	1.83	806.80	1.48	50.89	1.79	3.80	2.05	<LOD	NA	64.65	1.78
M11-LB (5cm)	44294.50	2.05	659.22	2.81	41.75	1.40	10.85	3.66	<LOD	NA	73.02	1.73
M11-LB (25cm)	37409.10	2.12	583.41	1.54	38.57	0.52	6.84	11.01	<LOD	NA	59.58	0.74
M11-LB (50cm)	38610.91	2.21	594.54	2.17	38.12	1.56	6.06	13.59	<LOD	NA	62.84	1.97
M11-RB (5cm)	35566.66	2.01	648.71	1.24	37.86	1.61	8.25	2.81	<LOD	NA	67.62	1.05
M11-RB (25cm)	36269.79	2.58	688.08	0.89	46.94	2.28	3.30	7.61	<LOD	NA	56.54	2.38
M11-RB (50cm)	39063.06	1.94	711.24	1.51	43.62	1.65	4.26	4.94	<LOD	NA	61.27	1.33
M12-A (5cm)	35680.30	0.88	481.90	0.99	50.38	0.62	6.39	2.09	<LOD	NA	60.42	1.55
M12-A (25cm)	78594.57	1.21	771.90	1.13	61.81	0.67	6.59	8.28	<LOD	NA	105.04	0.99
M12-A (50cm)	22492.10	3.05	425.03	3.78	14.08	2.04	14.00	2.95	<LOD	NA	48.82	2.49
M12-LB (5cm)	31019.60	3.00	550.44	0.81	25.84	3.36	7.41	7.18	<LOD	NA	80.19	1.13
M12-LB (25cm)	29629.08	3.66	610.62	1.14	28.31	2.42	2.43	4.22	<LOD	NA	62.92	2.70
M12-LB (50cm)	54848.08	1.30	391.02	4.19	22.69	1.22	8.72	5.92	15.85	2.00	65.14	34.96
M12-RB (5cm)	25944.98	1.00	375.79	2.63	16.57	2.50	14.61	2.51	<LOD	NA	95.75	4.62
M12-RB (25cm)	29254.77	1.96	464.21	2.02	20.09	2.26	20.17	0.19	<LOD	NA	60.66	1.48
M12-RB (50cm)	30012.56	1.01	469.34	1.00	19.57	1.95	20.24	1.17	<LOD	NA	62.47	2.76
M13-A (5cm)	36687.73	1.92	608.57	1.64	46.87	2.44	2.78	8.87	<LOD	NA	50.98	2.66
M13-A (25cm)	32714.94	2.69	617.64	0.34	44.06	2.46	1.63	4.92	<LOD	NA	46.97	2.52
M13-A (40cm)	34620.16	3.43	615.92	2.67	43.80	2.81	<LOD	NA	<LOD	NA	52.86	2.76
M13-LB (5cm)	58577.20	2.93	1011.36	2.16	67.65	2.08	3.60	2.50	<LOD	NA	77.89	1.67
M13-LB (25cm)	62342.56	2.70	1020.83	1.21	69.19	2.87	4.77	1.70	<LOD	NA	81.76	3.42
M13-LB (50cm)	51988.24	1.89	975.97	1.33	68.65	1.98	2.39	2.85	<LOD	NA	77.38	2.18
M13-RB (5cm)	44204.59	2.51	735.02	1.54	51.22	3.12	4.21	4.05	<LOD	NA	64.41	3.67
M13-RB (25cm)	52700.58	4.77	917.76	1.56	63.36	1.10	4.31	2.77	<LOD	NA	79.21	1.77
M13-RB (50cm)	51939.50	3.45	906.95	2.30	61.90	2.26	4.54	1.58	<LOD	NA	80.59	2.05
M14-A (5cm)	57127.60	1.20	436.99	2.94	42.00	2.11	6.66	1.81	16.55	11.20	149.86	13.35
M14-A (25cm)	91953.47	1.11	603.76	7.23	59.10	0.80	6.47	1.24	17.28	6.40	284.82	10.58
M14-A (40cm)	97038.86	0.92	751.43	9.77	55.18	1.25	10.87	0.43	15.42	9.22	99.84	46.53



Laboratorio Nacional de Geoquímica y Minerología
Universidad Nacional Autónoma de México
Geoquímica Ambiental



ID Campo	Al		As		Ba		Cd		Cr		Cu	
	mg/kg	RSD %	mg/kg	RSD %	mg/kg	RSD %	mg/kg	RSD %	mg/kg	RSD %	mg/kg	RSD %
M14-LB (5cm)	38227.98	1.99	17.68	7.89	176.29	0.36	6.33	2.79	105.51	1.09	25.50	0.81
M14-LB (25cm)	33987.94	2.76	16.18	7.53	152.59	0.24	4.46	6.49	59.34	1.53	20.54	0.61
M14-LB (50cm)	38729.37	2.81	17.73	12.56	170.16	1.17	8.91	2.08	79.77	1.87	39.62	2.22
M14-RB (5cm)	42272.13	2.52	19.66	4.23	159.48	0.68	5.10	4.74	40.86	2.77	29.40	1.87
M14-RB (25cm)	68190.12	2.09	22.33	6.91	201.72	0.69	5.68	2.41	57.62	1.32	19.44	0.65
M14-RB (50cm)	52664.29	0.55	15.87	3.55	201.87	0.04	5.94	0.93	65.73	1.65	21.44	0.61
M15-A (0-5cm)	26209.66	1.65	<LOD	NA	185.16	1.76	9.00	3.44	75.81	3.00	48.50	3.79
M15-A (5-25cm)	23123.79	0.89	<LOD	NA	169.62	0.94	8.76	6.00	62.15	4.21	42.51	3.74
M15-A (25-50cm)	28022.89	1.15	0.73	2.42	174.88	1.28	8.67	1.41	62.96	0.39	39.40	0.66
M15-A (+50cm)	44301.49	1.23	<LOD	NA	92.87	1.56	8.10	1.39	47.25	0.98	44.07	1.37
M15-A (roca)	41422.13	0.90	0.45	0.99	121.62	2.45	7.57	1.64	49.95	1.09	42.29	1.89
M15-LB (0-5cm)	38554.69	1.72	2.22	1.98	152.99	1.99	7.84	2.79	87.08	1.83	30.48	1.79
M15-LB (5-25cm)	39341.10	2.13	<LOD	NA	161.70	2.28	8.09	1.98	84.97	2.19	33.02	2.15
M15-LB (25-50cm)	41083.79	0.67	2.16	8.32	152.01	0.76	8.15	0.55	83.97	0.89	33.02	0.54
M15-RB (0-5cm)	33770.55	0.37	<LOD	NA	137.28	0.40	8.32	1.11	91.79	0.56	31.31	0.88
M15-RB (5-25cm)	38550.44	2.18	<LOD	NA	149.65	2.35	8.34	1.20	95.56	0.42	34.66	0.55
M15-RB (25-50cm)	40122.43	1.11	<LOD	NA	150.89	1.24	7.66	2.96	90.17	1.67	28.67	1.33
M16-A (0-5cm)	20340.28	1.31	<LOD	NA	160.54	1.49	7.39	1.10	65.73	1.92	30.96	1.25
M16-A (5-25cm)	20593.63	1.25	<LOD	NA	163.49	1.33	6.24	5.11	55.38	1.60	26.64	1.77
M16-A (25-50cm)	20517.86	1.13	<LOD	NA	165.21	1.06	7.19	0.93	60.99	2.38	30.31	2.31
M16-LB (0-5cm)	47960.31	0.82	2.07	11.02	176.98	0.88	7.90	0.73	79.55	1.88	36.28	1.80
M16-LB (5-25cm)	46365.60	0.95	2.36	9.34	194.29	0.88	8.20	2.56	80.43	2.35	34.43	1.54
M16-LB (25-50cm)	43642.30	0.85	1.48	7.32	190.10	0.84	8.19	0.40	66.46	2.70	47.48	2.21
M16-RB (0-5cm)	40530.54	1.14	1.39	3.12	180.67	1.19	8.20	3.01	71.30	0.57	47.37	1.28
M16-RB (5-cm)	43437.84	1.68	<LOD	NA	191.65	1.79	8.79	1.40	89.47	1.35	48.35	1.45
M16-RB (25-50cm)	42939.98	1.47	2.14	9.96	184.00	1.57	8.69	1.56	80.16	2.68	37.82	1.67



Laboratorio Nacional de Geoquímica y Minerología
Universidad Nacional Autónoma de México
Geoquímica Ambiental



ID Campo	Fe		Mn		Ni		Pb		Sb		Zn	
	mg/kg	RSD %	mg/kg	RSD %	mg/kg	RSD %	mg/kg	RSD %	mg/kg	RSD %	mg/kg	RSD %
M14-LB (5cm)	53522.44	2.26	753.04	2.30	54.08	1.68	11.63	0.86	<LOD	NA	86.58	1.40
M14-LB (25cm)	40315.55	2.50	696.00	2.36	48.94	2.18	5.60	1.09	<LOD	NA	63.41	1.86
M14-LB (50cm)	48482.80	2.68	731.71	2.50	55.99	2.05	10.79	1.53	<LOD	NA	84.28	1.26
M14-RB (5cm)	38438.51	2.94	431.74	2.81	27.90	1.49	15.39	2.48	<LOD	NA	74.48	2.75
M14-RB (25cm)	45031.95	2.16	610.46	2.00	45.72	2.01	10.94	7.49	<LOD	NA	73.69	1.34
M14-RB (50cm)	47786.85	0.63	719.31	0.45	49.13	1.77	7.88	11.87	<LOD	NA	71.77	1.66
M15-A (0-5cm)	49875.74	2.52	1243.53	3.29	91.54	2.88	<LOD	NA	5.91	2.05	81.46	3.05
M15-A (5-25cm)	46064.53	0.41	1177.38	1.20	88.27	3.68	<LOD	NA	5.00	1.49	70.52	3.59
M15-A (25-50cm)	46929.07	2.56	1185.80	2.76	89.37	0.16	<LOD	NA	5.01	2.01	73.43	0.62
M15-A (+50cm)	45889.42	0.79	905.48	0.25	74.93	1.09	<LOD	NA	3.16	1.77	76.26	1.49
M15-A (roca)	41708.08	0.72	1001.23	1.22	74.20	1.71	<LOD	NA	2.86	2.88	68.70	1.60
M15-LB (0-5cm)	43916.34	0.49	987.87	0.95	73.51	2.60	<LOD	NA	5.26	3.68	76.42	2.25
M15-LB (5-25cm)	45664.59	0.88	1001.37	1.20	73.99	2.41	<LOD	NA	3.84	0.16	76.76	2.21
M15-LB (25-50cm)	44927.00	0.26	974.03	1.22	72.28	2.53	<LOD	NA	5.79	1.09	75.68	0.55
M15-RB (0-5cm)	44889.58	0.88	927.91	0.36	64.87	0.13	<LOD	NA	2.90	1.71	73.31	0.54
M15-RB (5-25cm)	45670.03	0.12	961.52	1.02	66.67	0.70	<LOD	NA	5.01	2.60	79.50	0.45
M15-RB (25-50cm)	41919.09	0.48	901.22	0.68	65.53	0.74	<LOD	NA	4.84	2.41	72.12	1.28
M16-A (0-5cm)	40091.08	0.42	975.67	1.46	68.17	2.28	<LOD	NA	7.01	2.53	64.47	1.74
M16-A (5-25cm)	36413.83	0.39	931.38	0.35	62.92	1.29	<LOD	NA	3.68	0.13	58.51	2.04
M16-A (25-50cm)	38877.12	1.19	929.83	0.37	65.51	2.45	<LOD	NA	4.86	0.70	61.12	2.93
M16-LB (0-5cm)	44653.90	1.17	952.25	1.26	67.84	2.47	1.76	4.23	3.72	0.55	84.06	2.17
M16-LB (5-25cm)	45895.98	0.42	977.46	1.29	68.60	2.95	1.44	7.47	5.15	0.54	79.38	2.29
M16-LB (25-50cm)	43149.60	1.01	1031.87	1.14	70.09	2.65	2.25	3.32	6.44	0.45	82.59	2.46
M16-RB (0-5cm)	44907.83	0.22	970.41	0.71	69.07	1.13	3.26	9.15	7.07	1.28	88.15	0.81
M16-RB (5cm)	49656.89	0.32	1009.75	0.68	72.93	1.47	3.88	5.58	6.37	1.74	94.08	0.82
M16-RB (25-50cm)	48637.60	0.97	1072.62	1.63	73.43	1.91	1.65	8.79	7.76	5.54	85.97	2.76



CONTROL DE CALIDAD

En el caso de los análisis determinados por ICP-OES la concentración de cada elemento fue determinada por triplicado, el valor reportado es el promedio de las tres determinaciones reportando también la desviación estándar relativa (RSD) de las mediciones.

Para determinar la exactitud se utilizaron estándares de control analítico de concentraciones conocidas (5 y 50 ppm) los cuales fueron analizados como muestra para determinar su concentración por medio de curvas de calibración preparadas, indicando un buen desempeño del método de análisis.

% exactitud	Al	As	Ba	Cd	Cr	Cu	Fe	Mn	Ni	Pb	Sb	Zn
50 ppm	104.53	99.20	103.23	98.16	100.53	103.22	101.55	101.08	99.88	99.89	98.52	97.39
5 ppm	98.59	96.91	106.21	109.68	106.30	98.50	107.83	105.81	105.39	103.84	99.70	108.07

Sin mas por al momento quedo a sus ordenes.

Analizó:

Revisó:

QFB. Fabiola Vega García

M en C Luis Gerardo Martines Jardines

QA. Daniel Ramos Pérez

M en C Alicia Santana Silva



INFORME DE RESULTADOS ICP-OES
FONDOS

Datos del solicitante:

Dr. Francisco Martín Romero correo electrónico: fmrch@geologia.unam.mx, fmrch@hotmail.com

Dirección: Instituto de Geología, UNAM. Teléfono: 56224386 ext 129

Información de las muestras

Fecha de recepción de muestras: 13 de julio del 2015

Se recibieron 90 muestras de fondos de suelo. Las muestras se recibieron en bolsas de plástico de 25X10 cm.

Información de los análisis

En las 90 muestras se determinaron elementos traza por Espectrometría de Emisión Óptica con Plasma Inductivamente Acoplado (ICP-OES) en un equipo Pekin Elmer serie 8300.

Las muestras fueron digeridas por el método EPA 3051, los resultados se reportan en mg/kg.

Modo de inyección : Cámara ciclónica.

Limites de detección :

Los límites considerados son para modo de inyección cámara ciclónica y están reportados en mg/L.

LD mg/L	Al	As	Ba	Cd	Cr	Cu	Fe	Mn	Ni	Pb	Sb	Zn
	0.08	0.07	0.01	0.02	0.003	0.122	0.01	0.007	0.01	0.03	0.1	0.007

Lista de muestras:

ID Campo	coordenadas		ID Campo	coordenadas	
	X	Y		X	Y
F-Vicente G. 1	560577	3409923	F-S Gertrudis 1	566148	3396520
F-Vicente G. 2	558663	3410590	F-S Gertrudis 2	564449	3397136
F-Vicente G. 2Roca	558672	3410647	F-S Gertrudis 3 (0-5cm)	562455	3397287
F. Vicente G. 5 (5 cm)	554972	3406344	F-S Gertrudis 3 (5-25cm)	562455	3397287
F. Vicente G. 5 (25 cm)	554972	3406344	F-S Gertrudis 3 (25-50cm)	562455	3397287
F. Vicente G. 5 (50 cm)	554972	3406344	F-Bacanuchi I1 (0-5cm)	570280	3384774
F. Vicente G. 6	554738	3405426	F-Bacanuchi I1 (5-25cm)	570280	3384774
F. Vicente G. 7	554580	3405195	F-Bacanuchi I1 (25-50cm)	570280	3384774
F-R. Bacanuchi 1	562277	3402776	F-Bacanuchi I2 (0-5cm)	568528	3387253



Laboratorio Nacional de Geoquímica y Minerología
 Universidad Nacional Autónoma de México
 Geoquímica Ambiental



ID Campo	coordenadas		ID Campo	coordenadas	
	X	Y		X	Y
F-Bacanuchi I2 (5-25cm)	568528	3387253	F-Mazocahuí 1	585435	3268896
F-Bacanuchi I2 (25-50cm)	568528	3387253	F-Mazocahuí 2	587336	3270510
F-Bacanuchi I3 (0-5cm)	565140	3388400	F-Mazocahuí 3	590056	3271942
F-Bacanuchi I3 (5-25cm)	565140	3388400	F-Rayon 1	557090	3257929
F-Bacanuchi I3 (25-50cm)	565140	3388400	F-Rayón 2	553716	3263681
F-Bacanuchi D1	573778	3385894	F-Rayon 3	554469	3265889
F-Bacanuchi D2	574922	3386716	F-San Francisco 1-A (0-5cm)	535839	3232678
F-Bacanuchi D2-Roca	575052	3387553	F-San Francisco 1-A (5-25cm)	535839	3232678
F-Bacanuchi D3	575154	3387695	F-San Francisco 1-A (25-50cm)	535839	3232678
F-Tahuichopa 1	579685	3360491	F-San Francisco 1-LB (0-25cm)	535873	3232703
F-Tahuichopa 1 Roca	579685	3360491	F-San Francisco 1-LB (25-50cm)	535873	3232703
F-Tahuichopa 2	577630	3360955	F-San Francisco 1-RB (0-25cm)	535816	3232655
F-Tahuicopa 3	576578	3362620	F-San Francisco 1-RB (25-50cm)	535816	3232655
F-Tahuicopa 3 Roca	576578	3362620	F-San Francisco 2 roca	539060	3229795
F-Tahuichopa 4	579163	3364331	F-San Francisco 2-A (0-5cm)	539045	3229768
F-Tahuichopa 4 Roca	579131	3364268	F-San Francisco 2-A (5-25cm)	539045	3229768
F-Tahuichopa 5	577232	3368791	F-San Francisco 2-A (25-45cm)	539045	3229768
F-Tahuichopa 5 roca	577232	3368791	F-San Francisco 2-LB (0-5cm)	539067	3229780
F-Tahuichopa 6	576094	3372320	F-San Francisco 2-LB (5-25cm)	539067	3229780
F-Tahuichopa 6 Roca	576094	3372320	F-San Francisco 2-LB (25-40cm)	539067	3229780
F-Arizpe 1	576808	3357063	F-San Francisco 2-RB (0-5cm)	539024	3229763
F-Arispe 1 Roca	576795	3357032	F-San Francisco 2-RB (5-25cm)	539024	3229763
F-Arizpe 2	575076	3360046	F-San Francisco 2-RB (25-50cm)	539024	3229763
F-Arizpe 2 Roca	574919	3360063	F-San Francisco 3A (0-5cm)	538885	3228288
F-Arizpe 3	573823	3361921	F-San Francisco 3A (5-25cm)	538885	3228288
F-Arizpe 3 roca	573787	3361868	F-San Francisco 3A (25-40cm)	538885	3228288
F.S.J de baviacora 1A	581913	3290190	F-San Francisco 3-LB (0-5cm)	538873	3228299
F.S.J de baviacora 1-LB	581903	3290201	F-San Francisco 3-LB (5-25cm)	538873	3228299
F.S.J de baviacora 1-RB	581912	3290174	F-San Francisco 3-LB (25-50cm)	538873	3228299
F.S.J de baviacora 2A	584411	3294075	F-San Francisco 3-RB (0-5cm)	538883	3228261
F.S.J de baviacora 2 LB	584509	3293980	F-San Francisco 3-RB (5-25cm)	538883	3228261
F.S.J de baviacora 2-RB	584411	3294075	F-San Francisco 3-RB (25-50cm)	538883	3228261
F.S.J de baviacora 3 A	589640	3297200	F-San Francisco 3 roca	538904	3228302
F.S.J de baviacora 3 A (Blanco)	589640	3297200	F.La junta A(5cm)	528730	3229891
F.S.J de baviacora 3 LB	589640	3297200	F.La junta A(25cm)	528730	3229891
F.S.J de baviacora 3 Roca	589640	3297200	F.La junta A(50cm)	528730	3229891



Laboratorio Nacional de Geoquímica y Minerología
Universidad Nacional Autónoma de México
Geoquímica Ambiental



ID Campo	Al		As		Ba		Cd		Cr		Cu	
	mg/kg	RSD %	mg/kg	RSD %	mg/kg	RSD %	mg/kg	RSD %	mg/kg	RSD %	mg/kg	RSD %
F-Vicente G. 1	12827.71	1.43	19.56	6.93	100.67	1.05	4.37	2.37	37.28	4.50	34.41	1.00
F-Vicente G. 2	17186.12	1.36	14.70	7.14	127.69	1.37	6.08	2.70	42.66	1.34	29.44	3.01
F-Vicente G. 2Roca	25208.79	0.87	<LOD	NA	252.50	1.83	4.23	1.23	18.57	1.61	18.89	15.86
F. Vicente G. 5 (5 cm)	24211.04	0.46	4.34	1.84	192.01	0.57	4.04	1.86	18.48	2.76	20.44	6.43
F. Vicente G. 5 (25 cm)	18925.56	1.25	4.37	7.54	180.82	1.35	4.85	0.82	22.45	3.13	17.18	3.53
F. Vicente G. 5 (50 cm)	21908.90	0.74	<LOD	NA	214.79	0.71	6.20	2.11	29.30	3.20	14.17	3.28
F. Vicente G. 6	12605.35	2.77	<LOD	NA	145.24	2.83	5.97	4.03	109.55	4.13	25.42	4.43
F. Vicente G. 7	32305.98	0.12	<LOD	NA	420.80	0.21	3.97	4.41	13.43	3.56	4.93	9.15
F-R. Bacanuchi 1	14082.64	0.94	<LOD	NA	466.63	1.03	3.63	0.88	4.71	2.72	<LOD	NA
F-S Gertrudis 1	15118.92	2.25	14.65	7.58	183.39	0.66	5.26	2.77	20.49	1.75	16.13	1.44
F-S Gertrudis 2	26596.17	1.62	17.54	1.72	284.48	0.61	5.72	3.08	24.34	2.10	27.32	0.93
F-S Gertrudis 3 (0-5cm)	21744.84	0.19	<LOD	NA	178.00	1.52	4.69	1.48	22.40	1.60	34.57	2.42
F-S Gertrudis 3 (5-25cm)	16327.40	2.86	23.83	3.91	137.84	0.60	5.05	3.06	28.02	1.58	29.45	13.04
F-S Gertrudis 3 (25-50cm)	18755.76	1.79	26.02	7.89	149.72	0.74	4.38	1.12	20.64	0.37	24.53	1.86
F-Bacanuchi I1 (0-5cm)	25601.49	1.26	<LOD	NA	1185.03	2.17	3.45	3.23	37.46	4.86	25.31	10.12
F-Bacanuchi I1 (5-25cm)	14811.83	0.33	18.66	2.09	950.60	0.29	3.37	0.49	26.81	3.01	7.30	11.09
F-Bacanuchi I1 (25-50cm)	18944.60	2.34	16.10	6.12	709.77	0.83	3.18	0.99	27.49	1.05	9.85	7.26
F-Bacanuchi I2 (0-5cm)	15324.43	1.99	<LOD	NA	813.30	2.09	3.10	3.28	42.65	0.47	3.26	6.55
F-Bacanuchi I2 (5-25cm)	16046.71	3.17	<LOD	NA	704.76	1.06	3.06	2.09	45.91	2.98	6.59	9.76
F-Bacanuchi I2 (25-50cm)	17797.95	2.22	<LOD	NA	894.25	1.50	3.65	1.77	48.96	2.25	11.31	5.22
F-Bacanuchi I3 (0-5cm)	8372.91	1.02	<LOD	NA	260.06	1.21	1.90	1.42	44.99	3.49	<LOD	NA
F-Bacanuchi I3 (5-25cm)	10153.49	0.21	<LOD	NA	243.61	0.35	2.44	3.08	43.34	1.75	<LOD	NA
F-Bacanuchi I3 (25-50cm)	10481.29	0.64	<LOD	NA	229.20	0.67	2.66	2.04	8.82	0.65	<LOD	NA
F-Bacanuchi D1	39883.98	1.24	29.68	2.65	276.48	0.56	4.90	2.08	38.41	2.09	19.77	1.42
F-Bacanuchi D2	20426.03	0.50	15.12	9.58	193.98	0.63	4.39	0.91	86.35	2.64	23.12	0.90
F-Bacanuchi D2-Roca	31716.78	1.00	11.42	9.22	315.75	0.99	3.23	1.43	26.61	2.66	15.01	2.40
F-Bacanuchi D3	17547.97	1.55	15.74	9.18	118.84	0.80	4.67	1.91	24.14	3.76	30.40	1.51
F-Tahuichopa 1	24808.92	1.35	23.76	9.59	288.38	1.13	4.21	0.71	14.30	4.01	13.65	0.12
F-Tahuichopa 1 Roca	31021.38	2.31	13.81	8.04	108.11	0.60	3.49	0.37	8.86	0.60	7.49	7.04
F-Tahuichopa 2	21188.56	0.25	40.59	2.08	271.63	2.10	5.82	1.06	14.17	1.16	19.11	3.45
F-Tahuicopa 3	21193.25	1.01	38.25	3.43	176.35	0.18	4.32	1.76	8.62	1.72	22.76	2.89
F-Tahuicopa 3 Roca	14357.38	1.20	39.52	5.44	156.49	1.54	3.31	3.62	3.50	2.48	11.55	1.63
F-Tahuichopa 4	13768.70	0.51	<LOD	NA	189.30	0.51	1.55	3.94	9.58	0.62	61.40	3.83



Laboratorio Nacional de Geoquímica y Minerología
Universidad Nacional Autónoma de México
Geoquímica Ambiental



ID Campo	Fe		Mn		Ni		Pb		Sb		Zn	
	mg/kg	RSD %	mg/kg	RSD %	mg/kg	RSD %	mg/kg	RSD %	mg/kg	RSD %	mg/kg	RSD %
F-Vicente G. 1	31810.47	2.06	849.60	1.99	16.19	1.24	87.47	2.27	<LOD	NA	132.64	3.94
F-Vicente G. 2	49058.70	1.15	713.64	1.20	16.48	0.35	56.56	0.38	<LOD	NA	129.08	1.45
F-Vicente G. 2Roca	30543.02	1.70	705.62	1.58	13.20	2.40	19.83	3.95	<LOD	NA	75.79	1.20
F. Vicente G. 5 (5 cm)	28352.05	0.91	529.01	1.18	16.80	0.83	13.66	4.95	<LOD	NA	64.69	3.01
F. Vicente G. 5 (25 cm)	34439.10	1.61	571.46	1.35	18.05	3.70	17.16	1.26	<LOD	NA	72.61	3.02
F. Vicente G. 5 (50 cm)	44458.17	0.89	751.33	0.90	18.99	0.47	23.37	2.21	<LOD	NA	81.09	3.06
F. Vicente G. 6	41994.67	3.10	626.52	2.58	84.66	3.83	<LOD	NA	<LOD	NA	72.19	4.07
F. Vicente G. 7	28357.94	0.47	1108.48	0.45	12.68	1.09	6.10	9.37	<LOD	NA	60.03	2.15
F-R. Bacanuchi 1	27412.08	1.02	685.27	1.91	12.37	2.35	<LOD	NA	2.43	NA	82.96	1.76
F-S Gertrudis 1	41093.20	1.88	507.55	1.88	13.73	1.00	32.77	1.01	<LOD	NA	92.80	2.02
F-S Gertrudis 2	41892.18	1.96	624.12	1.94	14.96	0.99	36.24	0.85	<LOD	NA	117.98	1.63
F-S Gertrudis 3 (0-5cm)	32828.26	0.55	775.38	0.58	16.68	2.69	46.11	2.13	<LOD	NA	122.00	1.73
F-S Gertrudis 3 (5-25cm)	39868.03	3.66	713.47	3.56	17.19	1.06	48.64	1.67	<LOD	NA	117.97	1.15
F-S Gertrudis 3 (25-50cm)	32542.04	2.54	674.20	2.41	14.48	0.89	50.78	0.16	<LOD	NA	104.67	0.95
F-Bacanuchi I1 (0-5cm)	22860.21	0.34	1205.59	2.13	30.40	3.00	68.26	3.07	<LOD	NA	90.04	4.05
F-Bacanuchi I1 (5-25cm)	20994.23	0.19	876.76	1.36	27.63	0.94	44.92	1.46	<LOD	NA	98.46	2.59
F-Bacanuchi I1 (25-50cm)	22625.39	0.61	806.38	1.02	35.21	0.50	32.31	2.02	<LOD	NA	98.14	1.75
F-Bacanuchi I2 (0-5cm)	23846.18	0.15	918.26	1.10	43.76	0.63	40.61	1.50	<LOD	NA	73.70	1.56
F-Bacanuchi I2 (5-25cm)	22814.51	1.89	809.74	0.65	43.55	0.93	32.93	0.98	<LOD	NA	75.51	2.77
F-Bacanuchi I2 (25-50cm)	26655.70	0.52	848.75	0.96	46.34	0.73	32.59	3.17	<LOD	NA	89.50	1.96
F-Bacanuchi I3 (0-5cm)	16312.87	0.31	487.85	2.00	13.76	0.90	<LOD	NA	<LOD	NA	48.00	2.98
F-Bacanuchi I3 (5-25cm)	20510.34	0.45	519.31	0.40	14.55	0.43	5.98	7.89	<LOD	NA	55.14	1.93
F-Bacanuchi I3 (25-50cm)	21666.94	0.58	625.42	1.10	14.04	1.58	6.84	9.96	<LOD	NA	65.40	0.16
F-Bacanuchi D1	32570.50	1.78	997.27	1.68	24.93	0.66	59.31	0.36	<LOD	NA	116.74	1.51
F-Bacanuchi D2	32418.74	1.27	434.28	2.05	67.69	2.70	4.15	5.21	<LOD	NA	64.72	2.54
F-Bacanuchi D2-Roca	23421.33	1.84	483.41	1.77	29.28	0.67	8.53	1.37	<LOD	NA	62.53	2.81
F-Bacanuchi D3	34141.30	0.98	605.05	1.09	22.93	1.60	13.12	5.85	<LOD	NA	70.78	3.21
F-Tahuichopa 1	30336.34	2.39	538.29	2.37	13.49	1.73	26.97	1.30	<LOD	NA	82.16	3.32
F-Tahuichopa 1 Roca	26604.64	2.95	472.36	2.93	7.75	0.60	9.01	3.36	<LOD	NA	59.46	1.32
F-Tahuichopa 2	43368.84	0.57	801.25	0.50	15.16	1.97	47.72	2.89	<LOD	NA	139.65	1.25
F-Tahuicopa 3	31860.08	0.50	471.24	0.57	9.34	1.14	26.66	1.87	<LOD	NA	80.22	1.92
F-Tahuicopa 3 Roca	23588.42	0.98	81.05	1.31	3.46	6.59	55.82	2.21	<LOD	NA	34.40	2.28
F-Tahuichopa 4	19116.19	0.74	931.53	0.29	10.34	2.91	<LOD	NA	<LOD	NA	93.25	2.37



Laboratorio Nacional de Geoquímica y Minerología
Universidad Nacional Autónoma de México
Geoquímica Ambiental



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F-Tahuichopa 4 Roca	20915.90	1.61	<LOD	NA	298.47	1.77	2.31	5.96	19.57	1.72	64.46	1.32
F-Tahuichopa 5	9014.98	0.67	<LOD	NA	132.95	0.73	1.78	5.57	21.66	0.50	52.50	1.30
F-Tahuichopa 5 roca	29002.70	1.12	17.88	7.58	365.08	1.21	2.92	3.57	25.63	4.63	55.81	4.66
F-Tahuichopa 6	21280.28	0.80	<LOD	NA	313.79	0.93	2.24	3.28	23.23	1.79	52.32	1.76
F-Tahuichopa 6 Roca	4379.18	1.72	22.51	4.39	254.60	1.73	6.24	8.12	9.08	2.28	42.00	2.03
F-Arizpe 1	47411.30	2.22	<LOD	NA	645.01	2.37	4.24	3.80	19.99	2.98	28.28	2.80
F-Arizpe 1 Roca	25944.59	1.44	36.24	5.84	492.12	1.45	7.32	0.93	22.56	0.44	30.29	1.19
F-Arizpe 2	22793.25	1.35	38.68	8.04	396.52	1.44	5.37	2.18	12.49	0.50	36.45	1.67
F-Arizpe 2 Roca	35412.29	1.12	<LOD	NA	232.21	1.21	7.69	2.17	25.11	1.43	352.22	0.57
F-Arizpe 3	14288.80	1.21	51.92	4.33	221.26	1.38	4.76	0.50	<LOD	NA	42.16	2.32
F-Arizpe 3 roca	26650.13	3.48	28.21	6.07	318.46	3.68	5.60	1.74	16.67	0.86	27.06	0.49
F.S.J de baviacora 1A	11986.34	0.97	41.88	3.43	72.51	1.03	3.53	1.28	4.59	1.89	215.87	2.26
F.S.J de baviacora 1-LB	20573.08	0.46	65.65	1.10	143.45	0.54	4.76	2.44	11.18	6.16	137.63	3.48
F.S.J de baviacora 1-RB	25367.91	2.13	102.34	1.28	168.65	2.20	5.69	5.09	18.65	3.91	169.93	3.56
F.S.J de baviacora 2A	20410.75	2.83	120.27	2.16	126.66	3.18	6.23	0.84	13.59	1.31	212.46	0.85
F.S.J de baviacora 2-LB	29551.21	1.60	26.51	8.22	188.12	1.66	4.26	1.09	13.30	1.24	22.22	3.83
F.S.J de baviacora 2-RB	30456.23	2.34	34.56	3.45	145.65	2.34	4.78	1.76	13.77	1.98	26.87	4.76
F.S.J de baviacora 3 A	30164.86	1.29	<LOD	NA	182.64	1.41	5.02	6.93	12.38	1.83	16.27	2.23
F.S.J de baviacora 3 A (Blanco)	15023.34	2.40	171.32	2.23	88.75	2.47	6.38	1.54	11.55	2.55	102.46	1.22
F.S.J de baviacora 3 LB	29819.93	2.95	203.40	1.67	136.38	3.06	3.79	3.12	5.03	1.58	1252.39	0.85
F.S.J de baviacora 3 Roca	8549.24	3.57	<LOD	NA	34.01	4.39	4.42	6.78	5.65	1.21	21.52	3.25
F-Mazocahuí 1	16158.44	2.30	<LOD	NA	78.51	2.41	4.81	3.08	8.81	2.18	28.44	1.82
F-Mazocahuí 2	23628.21	0.48	<LOD	NA	66.46	0.37	5.78	0.53	10.66	1.44	31.75	1.76
F-Mazocahuí 3	8567.97	1.43	<LOD	NA	18.30	1.40	18.66	0.31	67.73	1.22	<LOD	NA
F-Rayón 1	21970.28	2.14	14.81	1.28	264.56	0.54	4.55	1.71	19.67	1.51	17.63	3.94
F-Rayón 2	26256.37	1.83	21.00	8.10	256.76	1.76	3.21	3.69	21.65	0.81	15.67	9.02
F-Rayón 3	25765.83	4.18	15.40	7.70	285.38	4.40	3.61	5.69	27.49	1.95	18.33	3.05



Laboratorio Nacional de Geoquímica y Minerología
Universidad Nacional Autónoma de México
Geoquímica Ambiental



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F-Tahuichopa 4 Roca	28533.01	0.71	597.68	0.97	24.03	0.67	7.48	8.08	<LOD	NA	76.44	1.81
F-Tahuichopa 5	21545.18	2.25	735.21	1.70	42.14	1.24	<LOD	NA	<LOD	NA	74.11	0.82
F-Tahuichopa 5 roca	34280.94	0.11	621.51	1.79	26.82	1.44	8.92	4.54	<LOD	NA	87.25	3.62
F-Tahuichopa 6	26113.92	1.82	491.75	0.84	35.20	0.24	4.72	12.74	<LOD	NA	66.35	2.68
F-Tahuichopa 6 Roca	79377.52	0.45	-2.60	2.53	7.00	3.08	12.13	4.16	<LOD	NA	28.25	2.10
F-Arizpe 1	25042.23	0.83	513.72	0.53	26.08	1.28	11.49	5.88	<LOD	NA	71.70	1.98
F-Arizpe 1 Roca	43192.48	1.11	749.26	1.36	21.50	1.35	32.57	2.71	<LOD	NA	116.58	0.99
F-Arizpe 2	32705.97	0.81	577.57	1.41	15.38	2.06	34.32	1.97	<LOD	NA	89.99	1.93
F-Arizpe 2 Roca	47765.55	0.79	92.95	0.36	36.71	1.41	7.50	9.82	<LOD	NA	175.42	0.97
F-Arizpe 3	27144.84	0.62	991.10	0.56	5.23	4.55	935.55	2.33	<LOD	NA	196.31	1.92
F-Arizpe 3 roca	33064.24	0.24	717.48	0.50	21.23	0.48	13.85	2.52	<LOD	NA	90.42	0.36
F.S.J de baviacora 1A	19124.80	1.11	397.33	2.33	7.44	0.80	25.22	1.75	<LOD	NA	171.09	1.98
F.S.J de baviacora 1-LB	30088.80	0.59	554.64	1.78	11.96	2.11	34.83	1.51	<LOD	NA	136.82	3.89
F.S.J de baviacora 1-RB	37503.64	2.40	673.88	2.54	16.28	0.30	44.93	1.13	<LOD	NA	146.78	3.70
F.S.J de baviacora 2A	38692.07	3.99	630.40	1.35	11.22	2.92	58.83	2.47	<LOD	NA	176.58	0.90
F.S.J de baviacora 2-LB	26962.11	1.73	878.07	1.09	12.64	1.85	43.68	2.45	<LOD	NA	131.32	0.90
F.S.J de baviacora 2-RB	2985.94	1.45	793.56	1.57	14.65	1.34	52.57	2.60	<LOD	NA	145.97	0.67
F.S.J de baviacora 3 A	32615.35	2.58	617.16	3.28	22.41	0.69	13.48	6.88	<LOD	NA	77.61	2.34
F.S.J de baviacora 3 A (Blanco)	43909.62	2.91	364.73	2.23	12.63	1.99	59.07	1.51	<LOD	NA	87.85	0.92
F.S.J de baviacora 3 LB	24867.26	3.39	297.66	1.12	6.33	1.52	56.50	2.27	<LOD	NA	119.81	1.39
F.S.J de baviacora 3 Roca	30024.61	1.70	367.69	1.76	18.66	0.99	2.93	6.77	<LOD	NA	70.99	2.32
F-Mazocahuí 1	30857.20	2.47	557.51	2.49	6.83	2.09	13.59	1.13	<LOD	NA	95.00	0.96
F-Mazocahuí 2	37206.12	0.44	729.63	0.63	10.41	1.69	9.07	4.23	<LOD	NA	99.49	0.83
F-Mazocahuí 3	134263.53	0.42	232.05	0.73	12.99	2.18	17.11	3.18	<LOD	NA	62.41	1.04
F-Rayón 1	34341.55	2.40	582.85	2.46	16.98	0.75	19.84	1.49	<LOD	NA	78.87	0.55
F-Rayón 2	22712.99	1.77	483.61	1.61	24.74	2.20	15.56	5.18	<LOD	NA	72.23	1.09
F-Rayón 3	25980.22	5.01	763.11	2.73	23.60	2.57	15.57	2.14	<LOD	NA	75.48	2.22



Laboratorio Nacional de Geoquímica y Minerología
Universidad Nacional Autónoma de México
Geoquímica Ambiental



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F-San Francisco 1-A (0-5cm)	6265.44	0.32	<LOD	NA	124.52	0.31	1.65	2.89	58.56	1.82	<LOD	NA
F-San Francisco 1-A (5-25cm)	4672.83	1.55	<LOD	NA	113.85	1.56	1.54	4.10	34.65	3.50	<LOD	NA
F-San Francisco 1-A (25-50cm)	4509.14	2.52	<LOD	NA	96.84	2.75	1.38	6.54	47.19	3.55	<LOD	NA
F-San Francisco 1-LB (0-25cm)	16240.72	2.07	<LOD	NA	356.46	2.17	2.59	1.11	35.58	2.65	<LOD	NA
F-San Francisco 1-LB (25-50cm)	19117.18	1.27	5.67	8.81	360.03	1.30	2.80	2.64	35.68	2.28	<LOD	NA
F-San Francisco 1-RB (0-25cm)	16038.32	1.07	<LOD	NA	274.54	1.17	3.24	0.78	33.69	1.78	<LOD	NA
F-San Francisco 1-RB (25-50cm)	16273.49	0.97	<LOD	NA	273.88	1.13	2.59	0.99	31.54	1.59	<LOD	NA
F-San Francisco 2 roca	20263.01	2.51	<LOD	NA	613.65	2.75	7.29	2.52	53.46	0.47	11.94	2.59
F-San Francisco 2-A (0-5cm)	5833.00	0.54	2.79	3.20	78.74	0.46	1.14	4.75	59.74	4.56	<LOD	NA
F-San Francisco 2-A (5-25cm)	7213.63	1.96	<LOD	NA	79.48	2.00	1.40	7.48	77.54	1.67	<LOD	NA
F-San Francisco 2-A (25-45cm)	8347.48	1.30	<LOD	NA	93.86	1.57	1.54	3.53	101.11	2.30	<LOD	NA
F-San Francisco 2-LB (0-5cm)	10420.04	2.43	<LOD	NA	142.72	2.49	2.51	5.79	36.08	1.26	<LOD	NA
F-San Francisco 2-LB (5-25cm)	16339.48	1.08	<LOD	NA	163.90	1.22	2.67	2.94	37.35	0.29	<LOD	NA
F-San Francisco 2-LB (25-40cm)	17167.99	2.27	<LOD	NA	190.89	2.28	2.61	3.04	26.57	1.68	<LOD	NA
F-San Francisco 2-RB (0-5cm)	11783.58	0.76	<LOD	NA	103.30	0.83	1.81	5.38	48.94	0.28	<LOD	NA
F-San Francisco 2-RB (5-25cm)	8571.59	3.52	<LOD	NA	96.32	3.68	1.43	1.05	90.22	3.13	<LOD	NA
F-San Francisco 2-RB (25-50cm)	6664.60	1.05	<LOD	NA	83.71	1.22	1.25	3.79	59.53	0.91	<LOD	NA
F-San Francisco 3A (0-5cm)	7367.94	1.49	<LOD	NA	86.30	1.62	1.35	6.40	68.21	0.59	<LOD	NA
F-San Francisco 3A (5-25cm)	6042.17	0.88	5.97	1.51	76.75	0.80	1.25	10.37	73.92	3.10	<LOD	NA



Laboratorio Nacional de Geoquímica y Minerología
Universidad Nacional Autónoma de México
Geoquímica Ambiental



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F-San Francisco 1-A (0-5cm)	13582.81	0.42	341.19	0.48	12.75	0.53	17.47	0.79	<LOD	NA	54.71	1.80
F-San Francisco 1-A (5-25cm)	13212.88	1.02	364.34	1.01	12.02	1.23	18.28	3.76	<LOD	NA	47.14	3.91
F-San Francisco 1-A (25-50cm)	11789.27	0.95	321.69	0.97	11.80	0.77	11.81	5.50	<LOD	NA	37.58	2.95
F-San Francisco 1-LB (0-25cm)	19172.29	0.57	465.74	1.57	16.02	0.71	36.05	2.35	<LOD	NA	65.47	1.91
F-San Francisco 1-LB (25-50cm)	19602.31	0.67	509.43	1.21	17.50	1.69	20.97	1.53	<LOD	NA	69.73	1.87
F-San Francisco 1-RB (0-25cm)	23760.74	0.77	491.30	0.93	23.55	0.95	14.45	6.50	<LOD	NA	60.44	1.21
F-San Francisco 1-RB (25-50cm)	19444.89	0.87	427.98	0.62	17.43	1.44	15.93	7.83	<LOD	NA	64.56	0.95
F-San Francisco 2 roca	53498.90	0.74	1336.87	1.31	47.33	1.99	<LOD	NA	<LOD	NA	105.54	1.22
F-San Francisco 2-A (0-5cm)	10619.94	0.15	232.35	0.11	12.40	0.50	8.02	6.68	<LOD	NA	36.95	0.71
F-San Francisco 2-A (5-25cm)	11609.58	2.46	243.35	2.47	10.26	1.79	6.48	5.34	<LOD	NA	35.42	1.03
F-San Francisco 2-A (25-45cm)	12546.19	1.58	233.31	1.55	11.05	3.08	6.59	8.62	<LOD	NA	42.19	2.15
F-San Francisco 2-LB (0-5cm)	18581.86	0.33	318.08	1.30	14.08	0.75	9.21	7.60	<LOD	NA	66.05	1.18
F-San Francisco 2-LB (5-25cm)	19378.60	0.20	376.23	1.15	14.53	1.82	11.09	0.88	<LOD	NA	58.12	0.17
F-San Francisco 2-LB (25-40cm)	18970.65	0.72	420.20	1.43	15.47	1.24	11.74	3.11	<LOD	NA	58.92	1.46
F-San Francisco 2-RB (0-5cm)	14739.11	1.06	258.23	1.39	13.31	0.76	7.71	3.40	<LOD	NA	39.16	0.68
F-San Francisco 2-RB (5-25cm)	12348.06	0.42	252.30	0.37	11.20	1.68	6.47	5.66	<LOD	NA	39.30	3.03
F-San Francisco 2-RB (25-50cm)	10990.82	0.49	275.13	0.53	10.53	1.76	<LOD	NA	<LOD	NA	37.22	0.29
F-San Francisco 3A (0-5cm)	12014.43	0.18	271.68	0.22	10.07	1.85	10.31	5.05	<LOD	NA	36.35	0.13
F-San Francisco 3A (5-25cm)	10430.51	1.66	231.42	1.71	9.83	1.07	7.52	6.61	<LOD	NA	38.99	1.29



Laboratorio Nacional de Geoquímica y Minerología
Universidad Nacional Autónoma de México
Geoquímica Ambiental



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F-San Francisco 3A (25-40cm)	7352.14	1.71	3.18	8.62	83.80	1.36	1.27	1.59	95.56	1.54	<LOD	NA
F-San Francisco 3-LB (0-5cm)	7654.34	1.98	<LOD	NA	114.52	2.01	2.04	1.16	34.43	0.83	<LOD	NA
F-San Francisco 3-LB (5-25cm)	7044.69	0.42	<LOD	NA	123.45	0.45	1.87	1.15	31.47	1.08	<LOD	NA
F-San Francisco 3-LB (25-50cm)	8327.63	0.57	<LOD	NA	137.01	0.56	2.02	1.79	35.09	0.49	<LOD	NA
F-San Francisco 3-RB (0-5cm)	10506.64	2.93	<LOD	NA	108.94	3.07	1.66	4.52	64.48	1.18	<LOD	NA
F-San Francisco 3-RB (5-25cm)	5658.13	0.46	<LOD	NA	101.81	0.46	1.54	4.14	32.18	1.59	<LOD	NA
F-San Francisco 3-RB (25-50cm)	9875.56	0.89	<LOD	NA	141.40	0.99	2.18	6.21	34.56	0.95	<LOD	NA
F-San Francisco 3 roca	20414.96	1.97	<LOD	NA	257.78	0.73	3.17	2.77	42.67	1.73	<LOD	NA
F.La junta A(5cm)	12992.91	1.47	49.16	4.56	101.46	0.46	3.20	0.05	8.72	0.59	11.67	3.89
F.La junta A(25cm)	14012.47	1.63	43.39	3.31	99.01	1.52	3.23	1.62	10.02	1.54	8.19	3.72
F.La junta A(50cm)	12504.59	2.37	41.78	1.71	103.48	1.85	3.12	0.48	9.70	0.89	8.61	1.44

ID Campo	Fe		Mn		Ni		Pb		Sb		Zn	
	mg/kg	RSD %	mg/kg	RSD %	mg/kg	RSD %	mg/kg	RSD %	mg/kg	RSD %	mg/kg	RSD %
F-San Francisco 3A (25-40cm)	10966.68	1.69	239.77	1.70	10.42	1.40	<LOD	NA	<LOD	NA	36.78	0.88
F-San Francisco 3-LB (0-5cm)	15497.47	1.02	276.83	0.75	11.97	2.99	<LOD	NA	<LOD	NA	56.19	1.01
F-San Francisco 3-LB (5-25cm)	15306.59	0.74	284.80	1.58	11.88	1.72	10.90	1.13	<LOD	NA	42.57	0.60
F-San Francisco 3-LB (25-50cm)	15766.38	1.29	301.62	1.73	12.85	1.98	<LOD	NA	<LOD	NA	51.75	1.25
F-San Francisco 3-RB (0-5cm)	13642.37	0.16	284.67	0.20	14.67	3.00	<LOD	NA	<LOD	NA	40.39	1.23
F-San Francisco 3-RB (5-25cm)	13854.37	0.69	223.11	0.65	10.74	0.40	<LOD	NA	<LOD	NA	39.52	1.62
F-San Francisco 3-RB (25-50cm)	16812.87	0.26	313.68	0.94	14.32	0.73	8.09	7.24	<LOD	NA	47.85	1.32
F-San Francisco 3 roca	21320.98	0.50	499.67	0.11	27.50	2.30	24.20	1.56	<LOD	NA	77.77	1.38



Laboratorio Nacional de Geoquímica y Minerología
Universidad Nacional Autónoma de México
Geoquímica Ambiental



ID Campo	Fe		Mn		Ni		Pb		Sb		Zn	
	mg/kg	RSD %	mg/kg	RSD %	mg/kg	RSD %	mg/kg	RSD %	mg/kg	RSD %	mg/kg	RSD %
F.La junta A(5cm)	22821.81	1.43	335.42	1.52	5.85	2.27	14.81	4.10	<LOD	NA	56.48	1.84
F.La junta A(25cm)	23470.59	1.55	276.54	1.42	5.85	1.60	12.81	2.27	<LOD	NA	56.65	1.23
F.La junta A(50cm)	22359.45	1.94	293.32	1.89	6.17	2.69	13.69	2.20	<LOD	NA	54.72	0.44

CONTROL DE CALIDAD

En el caso de los análisis determinados por ICP-OES la concentración de cada elemento fue determinada por triplicado, el valor reportado es el promedio de las tres determinaciones reportando también la desviación estándar relativa (RSD) de las mediciones.

Para determinar la exactitud se utilizaron estándares de control analítico de concentraciones conocidas (50 y 10 ppm) los cuales fueron analizados como muestra para determinar su concentración por medio de curvas de calibración preparadas, indicando un buen desempeño del método de análisis.

% exactitud	Al	As	Ba	Cd	Cr	Cu	Fe	Mn	Ni	Pb	Sb	Zn
50 ppm	104.27	92.95	104.66	98.20	100.59	103.55	101.90	101.00	100.03	100.34	97.60	96.61
10 ppm	95.98	99.55	105.46	108.01	103.26	99.49	106.39	111.85	109.28	100.66	100.37	105.06

Sin mas por al momento quedo a sus ordenes.

Analistas:

Responsable tecnico:

QFB. Fabiola Vega Garcia

M en C Luis Gerardo Martinez Jardines

QA Daniel Ramos Perez

M en C Alicia Santana Silva



INFORME DE RESULTADOS ICP
TINAJAS I

Información de las muestras

Se analizaron 80 muestras de 3 zonas diferentes TINAJAS I en Sonora.

Las muestras se recibieron en bolsas de plástico de 25X10 cm, etiquetadas como IT1, IT2 Y IT3 cada una con A,B,C,D,E,G,H e I con diferentes profundidades cada una un listado de coordenadas y observaciones adjunto.

Información de los análisis

En las 80 muestras se determinaron elementos traza por Espectrometría de Emisión Óptica con Plasma Inductivamente Acoplado (ICP-OES) en un equipo Pekin Elmer serie 8300

Las muestras fueron digeridas por el método EPA 3051, los resultados se reportan en mg/kg.
modo de inyección : Camara ciclónica.

Límites de detección :

Los límites considerados son para modo de inyección cámara ciclónica y están reportados en mg/l.

LD mg/L	Al	As	Ba	Cd	Cr	Cu	Fe	Mn	Ni	Pb	Sb	Zn
	0.08	0.07	0.01	0.02	0.003	0.122	0.01	0.007	0.01	0.03	0.1	0.007

<LOD= Bajo el límite de detección



Listado de recepción de muestras

IT1

No.	Clave	Profundidad	Coordenadas	
		cm	x	y
1	IT1A-100 5	5	563033	3420622
2	IT1A-100 5-25	25	563033	3420622
3	IT1A-100 25-50	50	563033	3420622
4	IT1B-50 5	5	563083	3420622
5	IT1B-50 25	25	563083	3420622
6	IT1B-50 50	50	563083	3420622
7	IT1C-10 5	5	563123	3420622
8	IT1C-10 5-25	25	563123	3420622
9	IT1C-10 25-50	50	563123	3420622
10	IT1D 5	5	563133	3420622
11	IT1D 25	25	563133	3420622
12	IT1D 50	50	563133	3420622
13	IT1E 5	5	563135	3420622
14	IT1E 25	25	563135	3420622
15	IT1E 50	50	563135	3420622
16	IT1F 5	5	563138	3420622
17	IT1F 5-25	25	563138	3420622
18	IT1F 25-50	50	563138	3420622
19	IT1G 5	5	563148	3420622
20	IT1G-10 25	25	563148	3420622
21	IT1G-10 50	50	563148	3420622
22	IT1H-50 0-5	5	563188	3420622
23	IT1H-50 20	20	563188	3420622
24	IT1I-100 5	5	563238	3420622
25	IT1I-100 25	25	563238	3420622
26	IT1I-100 25-50	50	563238	3420622

IT2

No.	Clave	Profundidad	Coordenadas	
		cm	x	y
1	IT2A-100 0-5	5	563047	3419594
2	IT2A-100 5-25	25	563047	3419594
3	IT2A-100 25-50	50	563047	3419594
4	IT2B-50 0-5	5	563097	3419594
5	IT2B-50 5-25	25	563097	3419594
6	IT2B-50 25-50	50	563097	3419594
7	IT2C-10 0-10	5	563137	3419594
8	IT2C-10 5-25	25	563137	3419594
9	IT2C-10 25-50	50	563137	3419594
10	IT2D 0-5	5	563161	3419594
11	IT2D 5-25	25	563161	3419594
12	IT2D 25-50	50	563161	3419594
13	IT2E 0-5	5	563165	3419594
14	IT2E 5-25	25	563165	3419594
15	IT2E 25-50	50	563165	3419594
16	IT2F 0-5	5	563170	3419594
17	IT2F 5-25	25	563170	3419594
18	IT2F 25-50	50	563170	3419594
19	IT2G-10 0-5	5	563197	3419594
20	IT2G-10 5-25	25	563197	3419594
21	IT2G-10 25-50	50	563197	3419594
22	IT2H-50 0-5	5	563232	3419594
23	IT2H-50 5-25	25	563232	3419594
24	IT2H-50 25-50	50	563232	3419594
25	IT2I-100 0-5	5	563285	3419594
26	IT2I-100 5-25	25	563285	3419594
27	IT2I-100 25-50	50	563285	3419594



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Universidad Nacional Autónoma de México
Geoquímica Ambiental



IT3

No.	Clave	Profundidad	Coordenadas	
		cm	x	y
1	IT3A-100 0-5	5	563697	3416583
2	IT3A-100 5-25	25	563697	3416583
3	IT3A-100 25-50	50	563697	3416583
4	IT3B-50 0-5	5	563747	3416583
5	IT3B-50 5-25	25	563747	3416583
6	IT3B-50 25-50	50	563747	3416583
7	IT3C-10 0-5	5	563787	3416583
8	IT3C-10 5-25	25	563787	3416583
9	IT3C-10 25-50	50	563787	3416583
10	IT3D 0-5	5	563800	3416583
11	IT3D 5-25	25	563800	3416583
12	IT3D 25-50	50	563800	3416583
13	IT3E-0-5	5	563805	3416583
14	IT3E 5-25	25	563805	3416583
15	IT3E 25-50	50	563805	3416583
16	IT3F 0-5	5	563808	3416583
17	IT3F 5-25	25	563808	3416583
18	IT3F 25-50	50	563808	3416583
19	IT3G-10 0-5	5	563818	3416583
20	IT3G 5-25	25	563818	3416583
21	IT3G 25-50	50	563818	3416583
22	IT3H-50 0-5	5	563868	3416583
23	IT3H-50 5-25	25	563868	3416583
24	IT3H-50 25-50	50	563868	3416583
25	IT3I-100 0-5	5	563908	3416583
26	IT3I-100 5-25	25	563908	3416583
27	IT3I-100 25-50	50	563908	3416583



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 Universidad Nacional Autónoma de México
 Geoquímica Ambiental



Resultados ICP

ID Muestra	Al	As	Ba	Cd	Cr	Cu
	mg/kg					
IT1A-100 5 cm	25732.459	45.108	62.681	1.445	16.448	302.667
IT1A-100 25	22500.939	32.406	106.235	1.332	15.343	150.362
IT1A-100 50	26563.513	33.114	142.612	1.443	14.576	150.458
IT1B-50 5cm	33841.456	61.788	104.698	5.096	14.773	1236.289
IT1B-50 25cm	27452.649	40.884	79.763	3.150	11.777	341.565
IT1B-50 50cm	23463.455	25.168	58.843	1.397	4.339	158.888
IT1C-10 5cm	21646.377	40.058	90.136	4.195	14.936	396.796
IT1C-10 25	25906.396	27.554	133.636	4.008	18.822	154.546
IT1C-10 50	25988.812	18.102	132.267	3.973	18.680	82.388
IT1D 5cm	17718.790	23.786	65.708	3.076	15.254	125.868
IT1D 25cm	12036.239	41.475	88.023	6.573	30.170	229.857
IT1D 50cm	18508.902	59.277	83.194	6.023	36.157	209.077
IT1E 5cm	16388.689	22.445	70.048	2.476	7.022	71.336
IT1E 25cm	15442.141	30.940	78.411	4.700	19.122	168.330
IT1E 50cm	13251.058	41.960	111.744	5.761	25.771	166.477
IT1F 5cm	18947.269	25.758	81.104	4.026	13.318	166.962
IT1F 25cm	17425.277	45.993	75.504	4.600	31.365	138.238
IT1F 50cm	18215.787	37.941	70.945	4.210	35.205	147.101
IT1G 5cm	20299.624	34.195	39.075	1.331	5.643	208.379
IT1G 25cm	15329.283	17.059	35.202	0.794	4.803	56.806
IT1G 50cm	43361.784	14.903	61.226	1.064	6.139	130.111
IT1H-50 5cm	27510.588	32.041	53.264	1.493	5.279	435.302
IT1H-50 25cm	24893.079	28.157	51.072	1.212	6.335	223.781
IT1H-50 50cm	30015.627	11.911	47.817	1.071	3.893	89.127
IT1I-100 5cm	23547.686	29.366	63.317	1.899	8.621	490.052
IT1I-100 25cm	35085.740	23.033	48.369	0.824	4.315	115.170
IT1I-100 50cm	25290.529	17.450	50.780	0.760	6.537	75.368
IT2A-100 5	56131.732	46.596	188.985	6.290	86.107	384.294
IT2A-100 25	72015.131	41.895	254.637	5.937	88.326	145.942
IT2A-100 50	67536.150	31.534	295.961	4.514	60.591	98.419
IT2B-50 5	54753.896	31.140	223.123	8.571	38.421	250.767
IT2B-50 25	62203.333	22.325	137.464	9.364	28.248	80.458
IT2B-50 50	61539.226	25.219	123.678	10.017	27.256	48.423



laboratorio Nacional de Geoquímica y Mineralogía
Universidad Nacional Autónoma de México
Geoquímica Ambiental



ID Muestra	Fe	Mn	Ni	Pb	Sb	Zn
	mg/kg					
IT1A-100 5 cm	9751.543	157.197	13.065	263.989	<LOD	106.068
IT1A-100 25	10016.811	191.640	12.358	413.048	<LOD	87.672
IT1A-100 50	11066.033	170.655	10.722	574.682	<LOD	99.411
IT1B-50 5cm	14565.604	2886.123	14.966	655.786	<LOD	217.828
IT1B-50 25cm	8340.346	1929.961	12.443	564.790	<LOD	186.799
IT1B-50 50cm	8135.619	1265.849	6.721	818.478	<LOD	161.788
IT1C-10 5cm	19389.288	1148.081	10.765	216.450	<LOD	163.285
IT1C-10 25	21716.551	1493.599	15.801	208.784	<LOD	198.716
IT1C-10 50	23161.794	1621.904	14.409	202.970	<LOD	234.755
IT1D 5cm	17039.695	1104.728	8.615	355.371	<LOD	300.091
IT1D 25cm	34018.233	1912.297	13.776	253.184	<LOD	281.088
IT1D 50cm	40687.184	795.457	16.635	168.695	<LOD	228.723
IT1E 5cm	12600.863	1136.724	3.988	470.426	<LOD	328.273
IT1E 25cm	26461.525	1340.699	9.163	293.943	<LOD	272.334
IT1E 50cm	33439.284	1594.465	10.660	283.791	<LOD	234.734
IT1F 5cm	17719.408	1191.864	8.734	362.927	<LOD	341.484
IT1F 25cm	31366.996	497.109	12.175	139.835	<LOD	212.174
IT1F 50cm	29686.405	488.083	14.643	90.340	<LOD	190.809
IT1G 5cm	9305.777	221.011	5.179	171.951	<LOD	83.844
IT1G 25cm	5819.307	116.162	4.436	121.941	<LOD	69.576
IT1G 50cm	8847.077	175.237	5.513	177.540	<LOD	122.595
IT1H-50 5cm	9666.007	653.837	5.041	179.763	<LOD	92.615
IT1H-50 25cm	8900.914	457.929	5.481	178.394	<LOD	81.361
IT1H-50 50cm	9307.393	144.718	4.115	167.843	<LOD	84.941
IT1I-100 5cm	6270.274	510.940	6.660	174.828	<LOD	73.158
IT1I-100 25cm	6256.859	53.248	4.018	138.123	<LOD	58.058
IT1I-100 50cm	6719.925	42.045	3.534	133.927	<LOD	50.180
IT2A-100 5	49357.831	876.543	70.907	45.333	<LOD	241.237
IT2A-100 25	44419.501	781.117	69.873	67.122	<LOD	224.278
IT2A-100 50	35155.061	314.732	37.020	71.693	<LOD	118.494
IT2B-50 5	45803.030	1830.453	45.952	244.424	<LOD	511.089
IT2B-50 25	53704.167	2003.423	37.264	143.759	<LOD	354.869
IT2B-50 50	54973.612	2123.130	39.868	106.824	<LOD	381.545





laboratorio Nacional de Geoquímica y Mineralogía
Universidad Nacional Autónoma de México
Geoquímica Ambiental



ID Muestra	Al	As	Ba	Cd	Cr	Cu
	mg/kg					
IT2C-10-5	40359.734	36.448	180.470	5.471	62.863	264.804
IT2C-10-25	43116.263	26.271	205.286	5.880	58.452	107.185
IT2C-10-50	45582.230	23.456	205.282	5.951	54.130	103.889
IT2D 5	18715.062	20.509	71.137	3.352	18.656	299.033
IT2D 25	19182.845	26.051	120.355	4.434	31.228	275.984
IT2D 50	18754.200	36.513	101.425	5.588	36.690	275.154
IT2E 5	22143.744	24.206	92.589	4.271	36.436	286.644
IT2E 25	21720.875	25.279	100.387	4.458	30.273	298.949
IT2E 50	23646.578	22.799	96.296	16.173	30.007	206.406
IT2F 5	26747.224	23.448	96.289	3.234	20.146	232.461
IT2F 25	20120.611	27.627	104.503	4.807	33.040	360.842
IT2F 50	17238.809	24.834	94.785	3.980	25.315	329.382
IT2G-10-5	45271.139	35.146	97.994	6.067	30.598	489.086
IT2G-10-25	54261.912	20.179	96.558	5.544	38.067	122.930
IT2G-10-50	65022.769	18.206	159.115	5.239	47.366	104.461
IT2H-50-5	54946.285	13.438	162.114	7.617	96.476	243.823
IT2H-50-25	56881.885	16.158	190.071	7.265	60.323	201.192
IT2H-50-50	63406.563	14.467	193.013	7.394	52.338	179.647
IT2I-100-5	33406.325	34.066	77.035	5.897	103.540	389.892
IT2I-100-25	39778.158	26.646	111.760	5.875	80.312	298.284
IT2I-100-50	50777.680	18.944	142.887	5.913	81.762	173.662
IT3A-100-5	35477.922	31.695	145.940	4.830	51.989	334.863
IT3A-100-25	46172.136	24.083	221.228	4.868	51.744	240.463
IT3A-100-50	42615.370	20.173	202.870	4.190	40.023	194.472
IT3B-50-5	25250.647	24.782	130.567	4.216	38.684	309.463
IT3B-50-25	29277.107	21.893	135.665	4.432	48.787	119.440
IT3B-50-50	33621.871	17.766	159.489	4.466	49.862	110.960
IT3C-10 5	25857.147	18.401	127.904	4.285	40.912	233.556
IT3C-10 25	26283.849	22.450	135.471	4.834	41.655	305.128
IT3C-10 50	25313.280	15.220	160.377	4.833	48.509	104.750
IT3D 5	20274.760	21.061	114.682	4.059	42.190	153.571
IT3D 25	23838.429	30.458	124.882	4.499	52.566	152.582
IT3D 50	21401.405	29.923	153.490	4.331	40.069	166.216



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Universidad Nacional Autónoma de México
Geoquímica Ambiental



ID Muestra	Fe	Mn	Ni	Pb	Sb	Zn
	mg/kg					
IT2C-10-5	44297.646	901.500	49.096	85.307	<LOD	224.564
IT2C-10-25	42420.412	1197.638	48.697	73.376	<LOD	223.776
IT2C-10-50	42676.852	1233.986	43.918	89.042	<LOD	295.027
IT2D 5	22564.854	719.938	15.276	93.478	<LOD	205.753
IT2D 25	37509.934	1942.514	16.673	182.262	<LOD	248.880
IT2D 50	49460.861	1210.238	17.716	175.255	<LOD	212.040
IT2E 5	33723.907	1146.341	17.585	213.656	<LOD	256.555
IT2E 25	33791.535	964.427	17.050	143.156	<LOD	221.399
IT2E 50	33696.053	734.953	18.244	121.418	<LOD	210.473
IT2F 5	23104.479	1169.730	11.544	345.767	<LOD	333.678
IT2F 25	37757.791	2015.885	17.614	247.007	<LOD	253.936
IT2F 50	30119.255	1896.116	17.727	147.291	<LOD	221.234
IT2G-10-5	42296.217	1546.982	36.972	113.690	<LOD	275.304
IT2G-10-25	43059.326	1273.033	43.762	70.268	<LOD	252.900
IT2G-10-50	45486.594	1245.791	46.323	56.014	<LOD	249.564
IT2H-50-5	52623.408	2175.195	61.120	181.484	<LOD	363.552
IT2H-50-25	47277.637	2500.368	46.829	208.986	<LOD	511.579
IT2H-50-50	51063.020	2543.438	42.620	200.658	<LOD	506.893
IT2I-100-5	49617.989	666.857	32.769	75.271	<LOD	132.999
IT2I-100-25	46725.320	1040.913	38.019	59.581	<LOD	126.017
IT2I-100-50	51907.820	889.646	42.072	57.615	<LOD	121.435
IT3A-100-5	38054.895	1122.723	26.196	119.686	<LOD	238.708
IT3A-100-25	38495.304	1263.682	30.159	118.910	<LOD	259.194
IT3A-100-50	35441.092	1089.615	25.897	91.410	<LOD	234.923
IT3B-50-5	33616.490	1143.266	18.982	120.197	<LOD	221.301
IT3B-50-25	38048.684	929.680	23.863	92.487	<LOD	213.360
IT3B-50-50	39953.757	908.390	23.968	91.020	<LOD	209.380
IT3C-10 5	32054.124	1133.965	24.625	100.100	<LOD	231.961
IT3C-10 25	33375.080	1378.602	25.335	123.696	<LOD	252.916
IT3C-10 50	35943.781	1523.754	29.738	108.504	<LOD	240.233
IT3D 5	32402.975	900.373	21.751	106.948	<LOD	204.788
IT3D 25	39140.775	681.859	21.646	116.917	<LOD	214.806
IT3D 50	36914.862	1390.305	23.006	141.903	<LOD	210.906



laboratorio Nacional de Geoquímica y Mineralogía
 Universidad Nacional Autónoma de México
 Geoquímica Ambiental



ID Muestra	Al	As	Ba	Cd	Cr	Cu
	mg/kg					
IT3E 5	17725.402	17.520	71.524	2.544	15.879	171.503
IT3E 25	21811.711	22.608	154.397	4.065	41.462	154.075
IT3E 50	21307.388	29.267	127.270	4.248	37.612	161.211
IT3F 5	18619.891	21.353	100.375	3.728	40.947	171.160
IT3F 25	24451.432	23.713	108.423	3.551	33.784	249.813
IT3F 50	20972.090	18.842	131.633	4.569	48.066	327.065
IT3G-10 5	22545.519	18.256	117.785	4.304	38.724	159.893
IT3G-10 25	31397.684	24.345	170.126	5.769	44.425	591.328
IT3G-10 50	30598.650	23.139	177.874	4.731	42.847	148.756
IT3H-50 5	21104.417	27.155	166.387	4.797	44.761	245.354
IT3H-50 25	20664.810	25.000	169.226	4.133	40.144	144.505
IT3H-50 50	21298.380	22.719	186.679	4.197	41.754	117.499
IT3I-100 5	20920.205	28.007	152.860	4.924	45.035	305.165
IT3I-100 25	25855.478	17.798	212.694	4.376	40.122	101.364
IT3I-100 50	25712.030	13.776	209.968	4.276	44.504	80.646

ID Muestra	Fe	Mn	Ni	Pb	Sb	Zn
	mg/kg					
IT3E 5	20762.847	550.256	12.950	66.156	<LOD	161.221
IT3E 25	35743.861	1105.998	18.799	94.323	<LOD	198.604
IT3E 50	36021.968	1179.309	19.975	105.705	<LOD	204.427
IT3F 5	33104.256	905.278	20.373	98.075	<LOD	192.665
IT3F 25	30640.002	869.515	19.574	87.338	<LOD	209.596
IT3F 50	37337.131	1434.748	25.110	133.021	<LOD	223.433
IT3G-10 5	31074.346	1200.272	24.375	109.408	<LOD	227.924
IT3G-10 25	35748.052	1859.673	30.282	160.651	<LOD	273.492
IT3G-10 50	37229.375	1679.790	27.844	109.114	<LOD	251.909
IT3H-50 5	37888.063	1595.444	22.685	127.455	<LOD	226.390
IT3H-50 25	34784.189	1250.552	21.349	112.412	<LOD	203.266
IT3H-50 50	35653.224	1635.106	23.196	157.764	<LOD	204.717
IT3I-100 5	35910.189	1627.405	19.442	117.245	<LOD	231.546
IT3I-100 25	35673.934	1646.749	22.532	99.932	<LOD	222.006
IT3I-100 25- 50	36221.604	1690.099	24.313	114.013	<LOD	218.346



CONTROL DE CALIDAD

En el caso de los análisis determinados por ICP-OES la concentración de cada elemento fue determinada por triplicado, el valor reportado es el promedio de las tres determinaciones la desviación estándar relativa (RSD) de las mediciones fue menor al 10%.

Para determinar la exactitud se utilizaron estándares de control analítico de concentraciones conocidas (50 y 10 ppm) los cuales fueron analizados como muestra para determinar su concentración por medio de curvas de calibración preparadas, indicando un buen desempeño del método de análisis.

% exactitud	Al	As	Ba	Cd	Cr	Cu	Fe	Mn	Ni	Pb	Sb	Zn
50 ppm	93.28	90.85	102.49	91.18	94.26	98.58	95.88	95.82	94.04	92.25	90.92	90.58
5 ppm	94.87	100.06	102.05	107.63	110.96	99.49	107.45	105.74	104.11	107.26	100.50	107.96

Sin mas por al momento quedo a sus ordenes.

Analizó:

QFB. Fabiola Vega García

M en C Alicia Santana Silva

Responsable técnico:

M en C Luis Gerardo Martínez Jardines



INFORME DE RESULTADOS ICP

TINAJAS II

27 de abril de 2015

Información de las muestras

Se analizaron 81 muestras de 3 zonas diferentes TINAJAS II en Sonora.

Las muestras se recibieron en bolsas de plástico de 25X10 cm, etiquetadas como IIT1, IIT2 Y IIT3 cada una con A,B,C,D,E,G,H e I con diferentes profundidades cada una un listado de coordenadas y observaciones adjunto.

Información de los análisis

En las 81 muestras se determinaron elementos traza por Espectrometría de Emisión Óptica con Plasma Inductivamente Acoplado (ICP-OES) en un equipo Pekin Elmer serie 8300

Las muestras fueron digeridas por el método EPA 3051, los resultados se reportan en mg/kg.

modo de inyección : Cámara ciclónica.

Limites de detección :

Los limites considerados son para modo de inyección cámara ciclónica y están reportados en mg/l.

LD mg/L	Al	As	Ba	Cd	Cr	Cu	Fe	Mn	Ni	Pb	Sb	Zn
	0.08	0.07	0.01	0.02	0.003	0.122	0.01	0.007	0.01	0.03	0.1	0.007

<LOD= Bajo el limite de detección



Listado de recepción de muestras

IIT1

No.	Clave	Profundidad	Coordenadas	
		cm	x	y
1	IIT1A 0-5	5	563874	3415746
2	IIT1A 25	25	563874	3415746
3	IIT1A 50	50	563874	3415746
4	IIT1B 0-5	5	563922	3415730
5	IIT1B 25	25	563922	3415730
6	IIT1B 50	50	563922	3415730
7	IIT1C 0-5	5	563959	3415724
8	IIT1C 25	25	563959	3415724
9	IIT1C 50	50	563959	3415724
10	IIT1D 0-5	5	563969	3415724
11	IIT1D 25	25	563969	3415724
12	IIT1D 50	50	563969	3415724
13	IIT1E 0-5	5	563972	3415725
14	IIT1E 25	25	563972	3415725
15	IIT1E 50	50	563972	3415725
16	IIT1F 0-5	5	563974	3415723
17	IIT1F 25	25	563974	3415723
18	IIT1F 50	50	563974	3415723
19	IIT1G 0-5	5	563974	3415723
20	IIT1G 25	25	563974	3415723
21	IIT1G 50	50	563974	3415723
22	IIT1H 0-5	5	564031	3415708
23	IIT1H 25	25	564031	3415708
24	IIT1H 50	50	564031	3415708
25	IIT1I 0-5	5	564093	3415702
26	IIT1I 25	25	564093	3415702
27	IIT1I 50	50	564093	3415702

IIT2

No.	Clave	Profundidad	Coordenadas	
		cm	x	y
1	IIT2A 5	5	563425	3410092
2	IIT2A 25	25	563425	3410092
3	IIT2A 50	50	563425	3410092
4	IIT2B 0-5	5	563478	3410088
5	IIT2B 25	25	563478	3410088
6	IIT2B 50	50	563478	3410088
7	IIT2C 0-5	5	563516	3410075
8	IIT2C 25	25	563516	3410075
9	IIT2C 50	50	563516	3410075
10	IIT2D 0-5	5	563527	3410074
11	IIT2D 25	25	563527	3410074
12	IIT2D 50	50	563527	3410074
13	IIT2E 5	5	563531	3410077
14	IIT2E 25	25	563531	3410077
15	IIT2E 50	50	563531	3410077
16	IIT2F 5	5	563535	3410074
17	IIT2F 25	25	563535	3410074
18	IIT2F 50	50	563535	3410074
19	IIT2G 5	5	563542	3410074
20	IIT2G 25	25	563542	3410074
21	IIT2G 50	50	563542	3410074
22	IIT2H 5	5	563577	3410047
23	IIT2H 25	25	563577	3410047
24	IIT2H 50	50	563577	3410047
25	IIT2I-5	5	563630	3410024
26	IIT2I-25	25	563630	3410024
27	IIT2I 50	50	563630	3410024



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Universidad Nacional Autónoma de México
Geoquímica Ambiental



IIT3

No.	Clave	Profundidad	Coordenadas	
		cm	x	y
1	IIT3A 5	5	563615	3404111
2	IIT3A 25	25	563615	3404111
3	IIT3A 50	50	563615	3404111
4	IIT3B 5	5	563638	3404153
5	IIT3B 25	25	563638	3404153
6	IIT3B 50	50	563638	3404153
7	IIT3C 5	5	563657	3404187
8	IIT3C 25	25	563657	3404187
9	IIT3C 50	50	563657	3404187
10	IIT3D 5	5	563662	3404196
11	IIT3D 25	25	563662	3404196
12	IIT3D 50	50	563662	3404196
13	IIT3E 5	5	563676	3404209
14	IIT3E 25	25	563676	3404209
15	IIT3E 50	50	563676	3404209
16	IIT3F 5	5	563685	3404211
17	IIT3F 25	25	563685	3404211
18	IIT3F 50	50	563685	3404211
19	IIT3G 0-5	5	563704	3404230
20	IIT3G 25	25	563704	3404230
21	IIT3G 50	50	563704	3404230
22	IIT3H 0-5	5	563742	3404273
23	IIT3H 25	25	563742	3404273
24	IIT3H 50	50	563742	3404273
25	IIT3I 0-5	5	563807	3404325
26	IIT3I 25	25	563807	3404325
27	IIT3I 50	50	563807	3404325



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Universidad Nacional Autónoma de México
Geoquímica Ambiental



Resultados de ICP:

ID Muestra	Al	As	Ba	Cd	Cr	Cu
	mg/kg					
IIT1A 0-5	12635.625	23.569	120.911	4.402	25.809	261.622
IIT1A 25	10775.712	23.540	109.721	4.228	23.616	140.411
IIT1A 50	10008.969	21.993	119.783	4.140	22.746	87.346
IIT1B 0-5	14541.912	22.188	144.541	4.513	28.978	144.218
IIT1B 25	24096.616	21.491	185.398	4.853	40.574	101.474
IIT1B 50	12671.359	20.332	138.441	4.283	25.529	97.166
IIT1C 0-5	12381.763	25.498	114.903	4.840	31.631	185.976
IIT1C 25	10947.967	17.806	108.240	4.253	27.225	151.810
IIT1C 50	11491.942	18.311	109.955	4.768	33.074	137.449
IIT1D 0-5	9415.382	16.923	113.487	4.044	26.619	189.116
IIT1D 25	8152.642	18.108	94.719	3.202	15.980	145.187
IIT1D 50	10230.721	21.905	105.802	4.165	23.646	135.684
IIT1E 0-5	9597.439	23.556	203.282	4.828	22.013	124.503
IIT1E 25	15925.027	22.679	168.241	4.240	27.375	107.208
IIT1E 50	14014.333	33.767	216.258	6.283	36.276	190.173
IIT1F 0-5	10583.589	22.449	185.237	4.751	21.061	153.126
IIT1F 25	10887.673	23.707	151.755	4.505	25.726	165.113
IIT1F 50	10236.921	23.000	125.281	3.981	21.771	155.058
IIT1G 0-5	9639.420	33.193	102.522	4.982	28.978	209.031
IIT1G 25	8389.562	27.057	109.031	4.145	22.018	105.140
IIT1G 50	9174.406	25.648	104.533	3.967	20.799	111.782
IIT1H 0-5	15588.502	25.132	156.514	5.584	23.170	462.096
IIT1H 25	14306.238	23.258	183.913	4.189	27.013	127.028
IIT1H 50	14008.291	20.860	149.454	4.036	26.558	105.070
IIT1I 0-5	15308.049	27.658	121.820	4.757	28.976	139.216
IIT1I 25	16074.039	20.813	171.593	3.832	21.181	65.766
IIT1I 50	25684.075	14.725	146.362	3.796	19.035	49.714
IIT2A 0-5	21293.104	23.956	132.755	4.312	25.341	107.061
IIT2A 25	31830.952	20.829	241.787	4.109	22.895	52.005
IIT2A 50	29395.544	18.675	191.998	3.865	20.743	51.890
IIT2B 0-5	21081.575	16.968	116.969	3.809	22.372	97.879
IIT2B 25	31360.162	15.890	164.105	3.918	20.840	51.874
IIT2B 50	19131.341	14.144	152.123	3.056	14.564	56.219



laboratorio Nacional de Geoquímica y Mineralogía
Universidad Nacional Autónoma de México
Geoquímica Ambiental



ID Muestra	Fe	Mn	Ni	Pb	Sb	Zn
	mg/kg					
IIT1A 0-5	25953.033	1085.008	17.905	119.286	<LOD	208.920
IIT1A 25	24729.376	1134.196	18.420	106.171	<LOD	193.049
IIT1A 50	26134.761	1242.265	19.472	125.367	<LOD	193.751
IIT1B 0-5	27125.526	1207.599	21.400	109.067	<LOD	211.212
IIT1B 25	32889.351	1230.369	23.258	92.709	<LOD	200.134
IIT1B 50	25913.772	1300.000	20.057	101.444	<LOD	202.618
IIT1C 0-5	29181.157	1286.156	21.906	122.500	<LOD	210.466
IIT1C 25	23203.732	1456.291	21.427	107.822	<LOD	194.381
IIT1C 50	27445.571	1403.001	25.598	111.270	<LOD	197.264
IIT1D 0-5	25129.326	1127.407	19.906	126.246	<LOD	186.343
IIT1D 25	19490.724	906.567	13.487	94.489	<LOD	151.539
IIT1D 50	26290.157	817.977	19.240	104.748	<LOD	166.167
IIT1E 0-5	26499.595	1954.744	18.218	115.756	<LOD	169.606
IIT1E 25	27533.743	1137.673	17.419	102.762	<LOD	165.818
IIT1E 50	39866.530	1803.931	28.894	172.451	<LOD	269.229
IIT1F 0-5	24951.879	1795.433	20.043	120.241	<LOD	203.517
IIT1F 25	29065.713	1654.541	23.101	264.019	<LOD	196.603
IIT1F 50	24506.668	955.167	19.848	103.929	<LOD	180.675
IIT1G 0-5	31547.198	1013.752	17.826	141.070	<LOD	166.257
IIT1G 25	27325.571	1171.085	20.325	131.444	<LOD	156.100
IIT1G 50	26431.253	938.766	18.626	94.086	<LOD	143.203
IIT1H 0-5	25062.672	1184.399	17.100	116.905	<LOD	241.574
IIT1H 25	27129.929	1176.983	21.028	88.053	<LOD	183.218
IIT1H 50	28454.260	1022.706	20.026	81.945	<LOD	162.583
IIT1I 0-5	28979.641	1214.125	19.956	112.831	<LOD	173.839
IIT1I 25	25454.939	1166.737	18.902	100.616	<LOD	151.831
IIT1I 50	22993.663	781.573	14.440	55.166	<LOD	115.342
IIT2A 0-5	27123.448	806.578	16.701	54.956	<LOD	106.062
IIT2A 25	28870.224	1504.715	18.331	48.019	<LOD	109.182
IIT2A 50	26468.903	827.848	17.465	43.799	<LOD	106.741
IIT2B 0-5	25944.641	736.172	16.357	39.897	<LOD	95.752
IIT2B 25	27670.694	670.461	19.842	42.586	<LOD	103.680
IIT2B 50	19849.552	642.296	16.845	37.465	<LOD	87.608



laboratorio Nacional de Geoquímica y Mineralogía
Universidad Nacional Autónoma de México
Geoquímica Ambiental



ID Muestra	Al	As	Ba	Cd	Cr	Cu
	mg/kg					
IIT2C 0-5	16518.152	13.008	154.950	3.266	16.720	48.225
IIT2C 25	16676.846	12.351	154.187	3.624	18.166	56.450
IIT2C 50	16860.532	12.855	163.149	3.751	17.929	42.787
IIT2D 0-5	15284.471	18.193	220.599	4.096	23.117	137.055
IIT2D 25	8130.501	22.488	129.525	3.406	17.695	94.772
IIT2D 50	7779.701	20.507	151.907	3.885	20.477	103.579
IIT2E 0-5	6017.381	19.104	159.591	2.953	15.000	90.767
IIT2E 25	5360.574	17.126	137.218	2.841	13.115	93.335
IIT2E 50	5096.492	29.592	115.566	2.921	14.188	99.355
IIT2F 0-5	6710.772	25.172	184.617	4.069	18.182	109.448
IIT2F 25	6136.338	18.457	114.483	2.692	13.223	110.507
IIT2F 50	8068.912	28.351	162.432	3.306	15.718	179.013
IIT2G 0-5	14996.320	14.057	203.457	3.480	17.833	57.669
IIT2G 25	9758.634	14.843	187.611	3.370	18.397	69.088
IIT2G 50	11478.466	10.940	166.270	2.972	14.417	54.609
IIT2H 0-5	15100.753	19.059	205.940	3.901	20.186	85.749
IIT2H 25	21062.786	14.386	221.955	4.169	20.747	72.413
IIT2H 50	18383.977	13.799	229.392	3.857	18.351	57.098
IIT2I 0-5	17122.477	18.710	208.457	4.877	22.117	179.900
IIT2I 25	18194.103	16.701	234.562	4.497	23.897	100.529
IIT2I 50	22474.985	15.002	259.526	4.675	26.601	92.398
IIT3A 0-5	8141.065	21.631	174.600	3.442	17.275	148.365
IIT3A 25	10093.433	23.370	195.079	3.509	18.238	208.430
IIT3A 50	11594.774	19.027	190.190	3.441	18.753	135.323
IIT3B 0-5	5873.676	18.641	167.375	3.087	18.108	79.529
IIT3B 25	6430.576	19.313	156.382	2.759	13.344	72.553
IIT3B 50	6529.855	21.118	157.317	2.999	13.306	76.735
IIT3C 0-5	5691.357	18.324	183.010	3.051	18.417	72.029
IIT3C 25	20168.566	27.482	197.223	4.978	35.354	78.653
IIT3C 50	18668.495	26.907	180.588	4.429	30.381	74.004
IIT3D 0-5	18114.005	29.884	181.182	4.721	27.528	151.448
IIT3D 25	23410.160	21.971	212.880	4.478	31.614	197.641
IIT3D 50	21956.450	17.639	202.219	4.521	41.636	40.021



laboratorio Nacional de Geoquímica y Mineralogía
Universidad Nacional Autónoma de México
Geoquímica Ambiental



ID Muestra	Fe	Mn	Ni	Pb	Sb	Zn
	mg/kg					
IIT2C 0-5	21127.947	786.651	14.666	43.489	<LOD	105.796
IIT2C 25	23416.799	744.347	15.083	37.951	<LOD	99.065
IIT2C 50	23409.775	826.104	16.660	32.937	<LOD	91.382
IIT2D 0-5	27106.808	926.556	19.090	63.624	<LOD	139.333
IIT2D 25	21751.057	874.032	12.916	81.553	<LOD	126.763
IIT2D 50	23503.039	875.188	14.778	73.934	<LOD	136.048
IIT2E 0-5	17406.523	927.919	13.727	59.677	<LOD	177.113
IIT2E 25	15711.988	927.074	12.625	58.150	<LOD	103.748
IIT2E 50	19255.062	648.091	11.437	59.252	<LOD	99.363
IIT2F 0-5	23355.992	1211.696	15.941	93.458	<LOD	165.928
IIT2F 25	16406.746	592.799	14.140	49.091	<LOD	106.276
IIT2F 50	21279.776	513.073	14.387	57.542	<LOD	107.596
IIT2G 0-5	21207.266	1057.976	20.429	56.635	<LOD	132.671
IIT2G 25	19681.824	1151.372	18.676	84.662	<LOD	129.266
IIT2G 50	17066.437	871.535	17.417	54.355	<LOD	111.108
IIT2H 0-5	23844.504	1138.714	22.281	65.961	<LOD	145.817
IIT2H 25	25794.546	1188.649	23.857	61.096	<LOD	159.166
IIT2H 50	23347.828	1111.556	22.510	58.258	<LOD	142.967
IIT2I 0-5	25501.598	1227.623	24.681	81.883	<LOD	195.711
IIT2I 25	26084.194	1219.170	26.195	74.065	<LOD	177.498
IIT2I 50	29432.939	1374.805	28.525	75.539	<LOD	206.834
IIT3A 0-5	21218.139	720.045	17.846	61.947	<LOD	112.210
IIT3A 25	22216.759	746.044	20.016	69.587	<LOD	120.636
IIT3A 50	21872.902	768.361	18.364	58.753	<LOD	112.229
IIT3B 0-5	18741.793	825.896	15.687	68.218	<LOD	99.797
IIT3B 25	17350.299	695.323	15.252	57.771	<LOD	99.955
IIT3B 50	18823.314	750.810	15.990	63.196	<LOD	103.257
IIT3C 0-5	18367.650	823.394	16.327	88.867	<LOD	102.298
IIT3C 25	32366.509	803.093	19.288	72.577	<LOD	150.649
IIT3C 50	29622.307	699.036	17.258	62.206	<LOD	120.501
IIT3D 0-5	28889.571	726.317	17.032	65.553	<LOD	143.190
IIT3D 25	29954.765	708.614	20.096	63.199	<LOD	144.450
IIT3D 50	29746.946	625.410	21.932	42.494	<LOD	120.175



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Universidad Nacional Autónoma de México
Geoquímica Ambiental



ID Muestra	Al	As	Ba	Cd	Cr	Cu
	mg/kg					
IIT3E 0-5	21433.191	26.341	252.109	6.023	44.417	299.342
IIT3E 25	18310.962	30.036	199.390	4.643	26.123	196.383
IIT3E 50	19104.744	29.416	199.475	5.015	30.252	209.171
IIT3F 0-5	12841.315	26.479	157.381	4.733	31.865	112.094
IIT3F 25	15497.996	26.544	194.796	5.627	43.946	117.986
IIT3F 50	22963.636	24.852	219.854	5.805	40.064	326.480
IIT3G 0-5	29278.291	23.198	276.815	5.286	40.062	99.901
IIT3G 25	33615.104	22.632	271.597	5.114	33.869	124.629
IIT3G 50	28302.577	18.758	244.641	5.151	40.175	84.698
IIT3H 0-5	31204.597	15.393	226.481	5.045	38.742	94.355
IIT3H 25	39240.114	18.938	300.821	5.302	36.166	95.538
IIT3H 50	43536.761	17.590	325.024	5.368	38.447	96.138
IIT3I 0-5	34683.648	21.001	281.377	5.260	34.054	150.736
IIT3I 25	46507.029	19.274	381.556	5.708	32.082	106.028
IIT3I 50	54235.915	19.602	400.637	5.773	32.685	98.327

ID Muestra	Fe	Mn	Ni	Pb	Sb	Zn
	mg/kg					
IIT3E 0-5	37519.826	997.669	21.898	79.812	<LOD	168.078
IIT3E 25	29831.562	808.579	17.776	80.218	<LOD	152.994
IIT3E 50	30338.372	876.396	19.282	67.924	<LOD	156.974
IIT3F 0-5	29772.302	657.712	17.302	60.392	<LOD	131.331
IIT3F 25	36351.164	937.594	19.944	72.651	<LOD	143.555
IIT3F 50	33899.139	823.354	21.527	62.922	<LOD	169.709
IIT3G 0-5	32756.341	903.687	22.933	69.173	<LOD	158.055
IIT3G 25	33727.798	939.462	22.085	65.430	<LOD	152.087
IIT3G 50	33896.138	980.007	22.164	64.932	<LOD	140.420
IIT3H 0-5	35003.754	831.116	24.741	55.406	<LOD	134.611
IIT3H 25	36100.299	1075.203	27.690	63.980	<LOD	171.876
IIT3H 50	36222.429	1048.488	32.886	56.933	<LOD	167.681
IIT3I 0-5	34872.234	957.381	24.069	67.864	<LOD	159.232
IIT3I 25	35873.921	1308.351	31.665	67.610	<LOD	197.523
IIT3I 50	37912.424	1348.585	35.983	65.662	<LOD	207.078



CONTROL DE CALIDAD

En el caso de los análisis determinados por ICP-OES la concentración de cada elemento fue determinada por triplicado, el valor reportado es el promedio de las tres determinaciones la desviación estándar relativa (RSD) de las mediciones fue menor al 10%

Para determinar la exactitud se utilizaron estándares de control analítico de concentraciones conocidas (50 y 10 ppm) los cuales fueron analizados como muestra para determinar su concentración por medio de curvas de calibración preparadas, indicando un buen desempeño del método de análisis.

% exactitud	Al	As	Ba	Cd	Cr	Cu	Fe	Mn	Ni	Pb	Sb	Zn
50 ppm	104.27	92.95	104.66	98.20	100.59	103.55	101.90	101.00	100.03	100.34	97.60	96.61
10 ppm	95.98	99.55	105.46	108.01	103.26	99.49	106.39	111.85	109.28	100.66	100.37	105.06

Sin mas por al momento quedo a sus ordenes.

Analizó:

QFB. Fabiola Vega García

M en C Alicia Santana Silva

Supervisor técnico:

M en C Luis Gerardo Martínez Jardines



**INFORME DE RESULTADOS ICP
BACANUCHI CANANEA, SONORA**

Información de las muestras

Se analizaron 75 muestras de 3 zonas de Bacanuchi Cananea, Sonora.

Las muestras se recibieron en bolsas de plástico de 25X10 cm, etiquetadas como B1, B2 Y B3 de la A asta la I con 3 profundidades representadas en cm cada una, y un listado de coordenadas y observaciones adjunto.

Información de los análisis

En las 75 muestras se determinaron elementos traza por Espectrometría de Emisión Óptica con Plasma Inductivamente Acoplado (ICP-OES) en un equipo Pekin Elmer serie 8300

Las muestras fueron digeridas por el método EPA 3051, los resultados se reportan en mg/kg.
modo de inyección : Camara ciclónica.

Limites de detección :

Los limites considerados son para modo de inyección cámara ciclónica y están reportados en mg/l.

LD mg/L	Al	As	Ba	Cd	Cr	Cu	Fe	Mn	Ni	Pb	Sb	Zn
	0.08	0.07	0.01	0.02	0.003	0.122	0.01	0.007	0.01	0.03	0.1	0.007

<LOD= Bajo el limite de detección



Listado de recepción de muestras

Clave	Coordenadas		Clave	Coordenadas		Clave	Coordenadas	
	x	y		x	y		x	y
B1A 0-5	564144	3402195	B2A 5	572849	3384627	B3A 5	580281	3361231
B1A 25	564144	3402195	B2A 25	572849	3384627	B3A 25	580281	3361231
B1A 50	564144	3402195	B2A 50	572849	3384627	B3A 50	580281	3361231
B1B 0-5	564185	3402260	B2B 5	572861	3384703	B3B 5	580329	3361277
B1B 25	564185	3402260	B2B 25	572861	3384703	B3B 25	580329	3361277
B1B 50	564185	3402260	B2B 50	572861	3384703	B3B 50	580329	3361277
B1C 0-5	564225	3402297	B2C 5	572908	3384733	B3C 5	580369	3361319
B1C 25	564225	3402297	B2C 25	572908	3384733	B3C 25	580369	3361319
B1C 50	564225	3402297	B2C 50	572908	3384733	B3C 50	580369	3361319
B1D 0-5	564237	3402305	B2D 5	572919	3384744	B3D 5	580381	3361325
B1D 25	564237	3402305	B2D 25	572919	3384744	B3D 25	No aplica	
B1D 50	564237	3402305	B2D 50	572919	3384744	B3D 50	No aplica	
B1E 5	564242	3402312	B2E 5	572927	3384761	B3E 5	580396	3361336
B1E 25	564242	3402312	B2E 25	572927	3384761	B3E 25	No aplica	
B1E 50	564242	3402312	B2E 50	572927	3384761	B3E 50	No aplica	
B1F 5	564246	3402320	B2F 5	572933	3384765	B3F 5	580408	3361341
B1F 25	564246	3402320	B2F 25	572933	3384765	B3F 25	No aplica	
B1F 50	564246	3402320	B2F 50	572933	3384765	B3F 50	No aplica	
B1G 5	564254	3402325	B2G 5	572942	3384773	B3H 5	580461	3361383
B1G 25	564254	3402325	B2G 25	572942	3384773	B3H 25	580461	3361383
B1G 50	564254	3402325	B2G 50	572942	3384773	B3H 50	580461	3361383
B1H 5	564275	3402357	B2H 5	572973	3384801	B3G 5	580418	3361350
B1H 25	564275	3402357	B2H 25	572973	3384801	B3G 25	580418	3361350
B1H 50	564275	3402357	B2H 50	572973	3384801	B3G 50	580418	3361350
B1I 5	564305	3402401	B2I 5	573009	3384832	B3I 5	580514	3361426
B1I 25	564305	3402401	B2I 25	573009	3384832	B3I 25	580514	3361426
B1I 50	564305	3402401	B2I 50	573009	3384832	B3I 50	580514	3361426



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Universidad Nacional Autónoma de México
Geoquímica Ambiental



Resultados ICP:

ID Muestra	Al	As	Ba	Cd	Cr	Cu
	mg/kg					
B1A 0-5 cm	14161.139	13.370	210.540	3.825	23.235	60.072
B1A 25 cm	18330.370	13.358	316.276	3.349	17.859	33.392
B1A 50 cm	13839.497	13.941	233.692	3.150	15.786	33.808
B1B 0-5 cm	15670.258	19.099	264.467	4.113	22.477	79.979
B1B 25 cm	20408.547	14.083	344.187	3.575	18.264	35.784
B1B 50 cm	16878.915	16.052	263.782	3.961	24.283	45.602
B1C 0-5 cm	7848.690	17.368	139.286	3.241	21.014	43.704
B1C 25 cm	11810.276	20.140	205.269	3.374	19.114	49.512
B1C 50 cm	13371.677	10.441	218.514	3.074	15.482	21.940
B1D 0-5 cm	8212.164	15.036	178.398	3.114	13.632	77.719
B1D 25 cm	10738.502	14.574	209.479	2.752	13.288	44.021
B1D 50 cm	11026.330	16.445	211.940	2.954	13.549	48.764
B1E 0-5 cm	8167.332	14.444	174.589	2.694	10.662	88.725
B1E 25 cm	8217.938	13.838	195.138	2.850	12.616	91.386
B1E 50 cm	9929.850	17.578	149.842	3.459	15.061	120.132
B1F 5 cm	7993.834	16.364	149.401	2.520	11.014	114.121
B1F 25 cm	8789.987	34.777	175.938	3.937	15.170	174.362
B1F 50 cm	6983.083	24.406	154.394	3.468	16.498	86.381
B1G 5 cm	9357.204	20.203	187.095	3.142	15.653	88.520
B1G 25 cm	11850.351	23.112	203.504	3.769	21.406	83.581
B1G 50 cm	11408.771	22.378	229.040	3.662	18.916	69.695
B1H 5 cm	18494.060	21.214	253.117	4.392	24.268	66.853
B1H 25 cm	23835.421	26.879	333.482	4.514	21.173	106.811
B1H 50 cm	15896.489	24.339	263.420	3.914	18.152	80.259
B1I 5 cm	20795.884	19.965	304.919	4.768	21.067	103.577
B1I 25 cm	25067.401	29.773	374.346	4.900	20.829	126.843
B1I 50 cm	17113.339	25.269	303.530	4.331	20.003	94.220
B2A 5 cm	15307.332	18.741	361.071	2.596	11.495	36.891
B2A 25 cm	17023.284	17.025	382.809	2.817	12.769	29.133
B2A 50 cm	14302.789	15.494	377.145	2.348	11.930	19.714
B2B 5 cm	14791.920	16.548	379.184	3.321	13.345	30.353
B2B 25 cm	11447.531	14.684	325.240	2.794	11.677	21.374
B2B 50 cm	15196.875	16.981	397.280	2.948	13.181	24.870



Laboratorio Nacional de Geoquímica y Mineralogía
Universidad Nacional Autónoma de México
Geoquímica Ambiental



ID Muestra	Fe	Mn	Ni	Pb	Sb	Zn
	mg/kg					
B1A 0-5 cm	26443.161	858.385	25.155	44.240	<LOD	118.520
B1A 25 cm	23499.675	915.505	26.479	28.375	<LOD	91.232
B1A 50 cm	20954.590	758.136	24.480	36.090	<LOD	111.045
B1B 0-5 cm	26659.749	1100.048	24.447	56.588	<LOD	130.898
B1B 25 cm	24117.882	932.485	26.956	26.727	<LOD	102.446
B1B 50 cm	27084.464	912.862	28.925	45.305	<LOD	126.776
B1C 0-5 cm	21473.234	762.609	17.243	52.596	<LOD	115.240
B1C 25 cm	22511.446	879.393	18.875	61.050	<LOD	117.654
B1C 50 cm	20986.209	592.484	21.394	18.527	<LOD	72.915
B1D 0-5 cm	18947.040	692.846	15.362	31.126	<LOD	92.296
B1D 25 cm	17843.978	655.555	19.602	33.859	<LOD	90.726
B1D 50 cm	18946.231	702.433	20.013	38.158	<LOD	98.037
B1E 0-5 cm	17500.612	774.706	14.651	32.544	<LOD	97.218
B1E 25 cm	18812.375	775.592	14.949	36.176	<LOD	104.024
B1E 50 cm	20934.524	588.072	16.068	34.000	<LOD	106.535
B1F 5 cm	16229.141	674.697	15.748	35.600	<LOD	97.199
B1F 25 cm	23204.838	743.623	16.293	63.388	<LOD	128.176
B1F 50 cm	21456.403	668.460	15.931	53.518	<LOD	115.215
B1G 5 cm	19657.648	763.559	17.517	54.968	<LOD	113.135
B1G 25 cm	23544.286	866.355	19.330	54.858	<LOD	118.030
B1G 50 cm	22278.924	863.441	19.424	55.804	<LOD	114.216
B1H 5 cm	27427.595	960.337	23.238	57.300	<LOD	128.655
B1H 25 cm	27634.133	1168.166	25.254	79.037	<LOD	173.951
B1H 50 cm	22858.117	1077.916	22.204	66.752	<LOD	156.556
B1I 5 cm	28075.503	1177.547	23.815	64.944	<LOD	153.134
B1I 25 cm	29174.450	1260.801	26.255	90.758	<LOD	190.668
B1I 50 cm	25843.796	1201.592	23.289	72.426	<LOD	152.950
B2A 5 cm	15107.770	562.306	17.360	14.508	<LOD	77.996
B2A 25 cm	15817.532	557.014	18.161	16.952	<LOD	85.082
B2A 50 cm	14249.865	613.249	15.972	16.015	<LOD	82.302
B2B 5 cm	17896.053	682.787	17.713	16.690	<LOD	89.848
B2B 25 cm	16611.600	500.843	15.442	15.812	<LOD	54.332
B2B 50 cm	18192.842	619.327	17.533	20.033	<LOD	60.159



Laboratorio Nacional de Geoquímica y Mineralogía
Universidad Nacional Autónoma de México
Geoquímica Ambiental



ID Muestra	Al	As	Ba	Cd	Cr	Cu
	mg/kg					
B2C 5 cm	6431.160	14.782	571.396	3.442	18.806	31.714
B2C 25 cm	8312.198	12.183	254.109	2.420	10.494	18.426
B2C 50 cm	6352.493	9.781	170.095	1.477	6.382	23.479
B2D 0-5 cm	13373.843	16.543	344.430	3.427	12.887	85.749
B2D 25 cm	9063.618	11.932	238.461	1.956	7.814	38.314
B2D 50 cm	7533.022	9.880	202.328	1.950	6.946	26.460
B2E 5 cm	7248.097	12.396	240.641	1.958	8.174	14.217
B2E 25-30 cm	7167.698	12.396	177.038	1.963	7.535	22.739
B2E 45-50 cm	7104.111	12.459	156.718	1.912	7.264	31.297
B2F 5 cm	8254.213	12.497	177.939	2.364	9.285	48.784
B2F 25 cm	7361.497	12.287	143.660	2.009	7.954	42.349
B2F 50 cm	6605.535	10.882	131.179	2.039	7.998	41.621
B2G 5 cm	9279.650	12.699	175.731	2.699	10.220	48.706
B2G 25 cm	11880.028	15.053	233.112	3.190	13.005	56.266
B2G 50 cm	12713.005	15.625	258.291	3.104	11.557	72.490
B2H 5 cm	16373.220	16.602	314.590	2.939	11.594	33.259
B2H 25 cm	21471.480	19.323	349.934	3.497	14.624	29.511
B2H 50 cm	18097.403	20.650	338.833	3.015	13.424	24.620
B2I 5 cm	27774.821	20.038	369.805	3.489	17.371	32.024
B2I 25 cm	25714.676	16.141	349.621	3.658	17.940	43.918
B2I 50 cm	25772.739	17.260	362.319	3.151	15.587	34.044
B3A 5 cm	15920.301	7.648	348.397	2.178	8.581	15.044
B3A 25 cm	14180.687	11.863	263.272	2.425	9.044	13.798
B3A 50 cm	10180.734	10.792	216.598	2.511	8.202	12.449
B3B 5 cm	22311.993	7.866	430.379	2.800	11.198	17.282
B3B 25 cm	18330.377	6.883	401.359	2.128	8.659	14.473
B3B 50 cm	19901.756	9.549	388.290	2.959	11.731	13.817
B3C 5 cm	17025.632	10.950	385.813	2.859	11.459	18.647
B3C 25 cm	18415.910	10.453	390.529	2.680	11.061	17.872
B3C 50 cm	16605.250	10.127	354.151	2.861	12.338	17.958
B3D 5 cm	6620.957	8.247	153.571	1.936	8.837	15.806
B3E 5 cm	7429.648	10.759	146.268	2.269	8.434	17.249
B3F 5 cm	6897.209	10.415	127.334	2.039	7.246	18.627
B3G 5 cm	8049.850	9.866	145.506	2.428	8.277	21.496



Laboratorio Nacional de Geoquímica y Mineralogía
Universidad Nacional Autónoma de México
Geoquímica Ambiental



ID Muestra	Fe	Mn	Ni	Pb	Sb	Zn
	mg/kg					
B2C 5 cm	21957.147	717.461	14.387	44.225	<LOD	66.498
B2C 25 cm	14463.435	429.733	12.167	17.547	<LOD	46.322
B2C 50 cm	9681.088	347.784	9.721	12.077	<LOD	42.384
B2D 0-5 cm	18797.519	714.663	18.098	30.462	<LOD	87.249
B2D 25 cm	10803.496	503.630	12.409	18.165	<LOD	59.626
B2D 50 cm	11198.065	399.908	11.072	11.714	<LOD	49.677
B2E 5 cm	12935.117	409.719	11.473	13.601	<LOD	42.476
B2E 25-30 cm	12829.117	389.287	11.040	13.605	<LOD	48.085
B2E 45-50 cm	12140.673	403.206	11.056	13.941	<LOD	53.371
B2F 5 cm	13870.859	492.073	12.647	22.027	<LOD	71.353
B2F 25 cm	12805.013	380.261	11.934	17.566	<LOD	63.823
B2F 50 cm	12716.142	369.910	10.628	17.328	<LOD	61.061
B2G 5 cm	15874.861	468.506	12.832	26.259	<LOD	72.570
B2G 25 cm	18727.877	594.193	15.725	28.747	<LOD	82.975
B2G 50 cm	19157.294	594.485	15.752	26.133	<LOD	80.681
B2H 5 cm	17518.812	748.695	19.375	23.203	<LOD	69.701
B2H 25 cm	20955.602	754.923	21.020	22.723	<LOD	74.099
B2H 50 cm	18477.361	845.888	19.572	17.233	<LOD	69.736
B2I 5 cm	21121.434	618.207	25.849	19.368	<LOD	68.405
B2I 25 cm	24174.261	608.592	26.386	25.397	<LOD	77.450
B2I 50 cm	20833.533	622.461	25.077	23.538	<LOD	74.992
B3A 5 cm	15401.885	403.006	13.330	5.333	<LOD	42.993
B3A 25 cm	17166.401	399.819	13.943	6.973	<LOD	45.434
B3A 50 cm	17354.616	421.987	13.734	8.067	<LOD	46.014
B3B 5 cm	19024.417	452.465	16.175	6.722	<LOD	51.350
B3B 25 cm	15371.331	407.048	14.059	5.677	<LOD	41.933
B3B 50 cm	21072.450	441.583	15.959	6.112	<LOD	49.510
B3C 5 cm	19061.202	441.471	17.982	9.135	<LOD	56.179
B3C 25 cm	19269.656	475.123	16.480	8.960	<LOD	54.547
B3C 50 cm	19793.700	496.821	19.141	9.701	<LOD	52.216
B3D 5 cm	13142.238	301.262	12.591	6.278	<LOD	41.140
B3E 5 cm	14801.156	318.184	13.607	8.509	<LOD	44.558
B3F 5 cm	13831.887	323.820	13.000	6.525	<LOD	43.839
B3G 5 cm	17154.795	393.908	13.883	8.297	<LOD	49.925



ID Muestra	Al	As	Ba	Cd	Cr	Cu
	mg/kg					
B3G 25 cm	7717.119	10.528	148.598	1.979	7.631	21.437
B3G 50 cm	8030.612	9.855	159.374	2.434	8.165	22.431
B3H 5 cm	8529.562	9.251	180.897	2.211	9.140	22.037
B3H 25 cm	9231.412	11.471	183.943	2.659	11.728	23.250
B3H 50 cm	10662.088	10.551	209.280	3.257	17.292	24.091
B3I 5 cm	9405.463	9.893	210.028	2.776	11.348	27.434
B3I 25 cm	9544.860	9.660	208.687	2.626	13.132	24.600
B3I 50 cm	9624.226	14.178	175.617	3.113	16.404	15.203

ID Muestra	Fe	Mn	Ni	Pb	Sb	Zn
	mg/kg					
B3G 25 cm	14676.935	342.658	13.778	7.524	<LOD	53.258
B3G 50 cm	15952.576	346.826	15.143	8.487	<LOD	85.576
B3H 5 cm	14173.640	333.087	14.779	9.448	<LOD	59.721
B3H 25 cm	17877.123	377.754	15.959	10.845	<LOD	68.978
B3H 50 cm	21483.843	386.614	18.326	14.619	<LOD	63.909
B3I 5 cm	17964.024	378.284	15.867	11.176	<LOD	56.395
B3I 25 cm	17952.611	381.255	16.883	13.053	<LOD	72.502
B3I 50 cm	20912.379	343.211	17.237	10.757	<LOD	55.767

CONTROL DE CALIDAD

En el caso de los análisis determinados por ICP-OES la concentración de cada elemento fue determinada por triplicado, el valor reportado es el promedio de las tres determinaciones, la desviación estándar relativa (RSD) de las mediciones fue menor al 10 %.

Para determinar la exactitud se utilizaron estándares de control analítico de concentraciones conocidas (5 y 50 ppm) los cuales fueron analizados como muestra para determinar su concentración por medio de curvas de calibración preparadas, indicando un buen desempeño del método de análisis.

% exactitud	Al	As	Ba	Cd	Cr	Cu	Fe	Mn	Ni	Pb	Sb	Zn
50 ppm	103.92	100.18	104.66	97.99	100.09	103.57	101.56	100.29	98.71	101.64	101.04	98.08
5 ppm	105.72	109.72	109.11	111.79	105.09	103.23	105.52	107.18	104.28	106.00	109.03	108.36



**Laboratorio Nacional de Geoquímica y Mineralogía
Universidad Nacional Autónoma de México
Geoquímica Ambiental**



Sin mas por al momento quedo a sus ordenes.

Analistas:

Responsable técnico:

QFB. Fabiola Vega García

M en C Luis Gerardo Martínez Jardines

M en C Alicia Santana Silva



**INFORME DE RESULTADOS DE ICP
SONORA**

Información de las muestras

Se analizaron 77 muestras de 3 zonas diferentes correspondientes a Arizpe, Aconchi y San Francisco en Sonora.

Las muestras se recibieron en bolsas de plástico de 25X10 cm, etiquetadas como S1 para Arizpe, S2 para Aconchi y S3 para San Francisco cada una con A,B,C,D,E,G,H e I con 3 profundidades cada una un listado de coordenadas y observaciones adjunto.

Información de los análisis

En las 77 muestras se determinaron elementos traza por Espectrometría de Emisión Óptica con Plasma Inductivamente Acoplado (ICP-OES) en un equipo Pekin Elmer serie 8300

Las muestras fueron digeridas por el método EPA 3051, los resultados se reportan en mg/kg.

modo de inyección : Cámara ciclónica.

Limites de detección :

Los limites considerados son para modo de inyección cámara ciclónica y están reportados en mg/l.

LD mg/L	Al	As	Ba	Cd	Cr	Cu	Fe	Mn	Ni	Pb	Sb	Zn
	0.08	0.07	0.01	0.02	0.003	0.122	0.01	0.007	0.01	0.03	0.1	0.007

<LOD= Bajo el limite de detección



Listado de recepción de muestras

ARIZPE

No	clave	Profundidad	Coordenadas	
		cm	x	y
1	S1A 5	5	580837	3356585
2	S1A.25	25	580837	3356585
3	S1A.50	50	580837	3356585
4	S1B 0-5	5	580873	3356560
5	S1B 25	25	580873	3356560
6	S1B 40	40	580873	3356560
7	S1C 0-5	5	580913	3356543
8	S1C 25	25	580913	3356543
9	S1C 50	50	580913	3356543
10	S1D 0-5	5	580923	3356535
11	S1D 30	30	580923	3356535
12	S1E 0-5	5	580938	3356529
13	S1E 0-5	25	580938	3356529
14	S1E 20	50	580938	3356529
15	S1F 0-5	5	580953	3356523
16	S1G 0-5	5	580877	3356453
17	S1G 25	25	580877	3356453
18	S1G 50	50	580877	3356453
19	S1H 0-5	5	580905	3356446
20	S1H 25	25	580905	3356446
21	S1H 50	50	580905	3356446
22	S1I 0-5	2	580954	3356422
23	S1I 25	25	580954	3356422
24	S1I 50	50	580954	3356422



ACONCHI

No	Clave	Profundidad	Coordenadas	
		cm	x	y
1	S2A 0-5	5	574412	3298668
2	S2A .25	25	574412	3298668
3	S2A 50	50	574412	3298668
4	S2A 100	100	574412	3298668
5	S2B 0-5	5	574461	3298695
6	S2B .25	25	574461	3298695
7	S2B 50	50	574461	3298695
8	S2C 0-5	5	574502	3298723
9	S2C 25	25	574502	3298723
10	S2C 50	50	574502	3298723
11	S2C 100	100	574502	3298723
12	S2D 0-5	5	574509	3298729
13	S2D 22	22	574509	3298729
14	S2E 0-5	5	574520	3298737
15	S2E 15-20	20	574520	3298737
16	S2F 0-5	5	574524	3298742
17	S2F 15	15	574524	3298742
18	S2G 0-5	5	574531	3298745
19	S2G 25	25	574531	3298745
20	S2G 50	50	574531	3298745
21	S2H 0-5	5	574546	3298754
22	S2H 25	25	574546	3298754
23	S2H 50	50	574546	3298754
24	S2I 0-5	5	574583	3298762
25	S2I 25	25	574583	3298762
26	S2I 50	50	574583	3298762



SAN FRANCISCO

No	clave	profundidad	X	Y
		cm		
1	S3A-100.0-5	5	535006	3235131
2	S3A-100.25	25	535006	3235131
3	S3A-100.50	50	535006	3235131
4	S3B-50.0-5	5	534932	3235096
5	S3B-50.25	25	534932	3235096
6	S3B-50.50	50	534932	3235096
7	S3C-10.0-5	5	534894	3235082
8	S3C-10.25	25	534894	3235082
9	S3C-10.50	50	534894	3235082
10	S3D.0-5	5	534888	3235069
11	S3D.25	25	534888	3235069
12	S3D.50	50	534888	3235069
13	S3E.0-5	5	534867	3235061
14	S3E.25	25	534867	3235061
15	S3E.50	50	534867	3235061
16	S3F-10.0-5	5	534852	3235047
17	S3F-10.25	25	534852	3235047
18	S3F-10.50	50	534852	3235047
19	S3G-50.0-5	5	534843	3235048
20	S3G-50.25	25	534843	3235048
21	S3G-50.50	50	534843	3235048
22	S3H-100.0-5	5	534805	3235029
23	S3H-100.25	25	534805	3235029
24	S3H-100.50	50	534805	3235029
25	S3I-100.0-5	5	534747	3235026
26	S3I-100.25	25	534747	3235026
27	S3I-100.50	50	534747	3235026

Resultados de ICP:



Laboratorio Nacional de Geoquímica y Mineralogía
Universidad Nacional Autónoma de México
Geoquímica Ambiental



ARIZPE.

muestra	Al	As	Ba	Cd	Cr	Cu
	mg/Kg					
S1A 5	8000.674	9.461	178.238	2.047	7.196	29.095
S1A.25	9273.342	8.034	162.029	2.567	7.983	30.283
S1A.50	10554.489	9.669	211.624	3.114	13.804	31.306
S1B 0-5	8606.421	9.991	202.316	2.815	13.326	27.379
S1B 25	6937.099	9.319	125.024	2.019	6.134	22.949
S1B 40	5838.021	7.375	121.165	1.760	5.280	21.772
S1C 0-5	6383.096	7.883	140.377	1.724	6.250	21.202
S1C 25	6677.195	7.518	122.511	2.380	8.732	19.674
S1C 50	6232.706	9.114	127.756	1.997	5.995	22.288
S1D 0-5	5803.182	7.200	112.395	1.630	4.771	19.144
S1D 30	6065.341	7.635	120.118	1.629	5.613	19.820
S1E 0-5	6097.732	6.632	121.517	1.370	4.020	18.249
S1E 0-5	5142.337	6.877	100.087	1.268	3.826	17.075
S1E 20	6392.223	10.963	135.186	1.482	4.223	18.308
S1F 0-5	5686.561	6.671	125.886	1.454	5.058	20.328
S1G 0-5	5599.947	6.142	120.966	1.400	3.886	16.860
S1G 25	29102.251	12.328	280.839	4.511	20.763	64.733
S1G 50	20771.986	9.119	233.953	4.206	18.841	57.823
S1H 0-5	14778.617	8.438	178.695	3.871	14.925	24.708
S1H 25	31891.363	11.913	286.053	4.325	18.439	55.169
S1H 50	25118.665	11.794	256.139	4.235	18.297	45.543
S1I 0-5	40706.753	17.232	368.277	4.679	16.420	31.939
S1I 25	38777.690	30.486	331.280	17.122	27.520	46.862
S1I 50	44833.672	18.442	386.887	4.730	15.320	18.365

muestra	Fe	Mn	Ni	Pb	Sb	Zn
	mg/Kg					
S1A 5	14215.365	327.636	11.227	11.624	<LOD	50.938
S1A.25	16089.968	326.578	11.875	8.358	<LOD	46.243
S1A.50	20305.569	360.780	15.312	10.908	<LOD	51.825
S1B 0-5	19442.378	372.542	15.042	12.364	<LOD	53.522
S1B 25	12617.516	299.012	11.086	7.579	<LOD	40.281
S1B 40	11397.703	304.779	9.749	10.743	<LOD	37.391

NA= No aplica

<LOD= Debajo del límite de detección



muestra	Fe	Mn	Ni	Pb	Sb	Zn
	mg/Kg					
S1C 0-5	11180.827	281.049	11.122	8.095	<LOD	38.037
S1C 25	17229.547	309.697	11.451	8.458	<LOD	38.814
S1C 50	12035.173	354.559	8.826	10.351	<LOD	41.517
S1D 0-5	10512.453	269.387	9.107	7.010	<LOD	32.721
S1D 30	11304.999	280.699	9.798	8.446	<LOD	36.092
S1E 0-5	9792.200	287.687	8.302	6.925	<LOD	32.453
S1E 0-5	8973.326	258.606	7.964	6.581	<LOD	31.232
S1E 20	9680.388	279.835	8.348	6.325	<LOD	32.604
S1F 0-5	9728.709	276.978	8.237	7.265	<LOD	32.950
S1G 0-5	9218.480	273.297	7.411	8.026	<LOD	32.517
S1G 25	30011.604	579.453	18.414	17.640	<LOD	82.820
S1G 50	29199.707	505.379	17.377	15.360	<LOD	74.556
S1H 0-5	24141.482	389.582	13.274	13.130	<LOD	56.966
S1H 25	31017.487	687.777	17.870	18.577	<LOD	88.143
S1H 50	29570.897	573.673	17.639	16.927	<LOD	78.057
S1I 0-5	31161.797	808.888	17.472	16.126	<LOD	99.928
S1I 25	26408.638	709.423	29.557	46.296	<LOD	103.854
S1I 50	31924.809	879.842	17.971	16.597	<LOD	99.745

ACONCHI.

muestra	Al	As	Ba	Cd	Cr	Cu
	mg/Kg					
S2A 0-5	226743.543	11.342	267.989	3.876	16.874	47.987
S2A .25	31478.467	11.325	288.417	3.758	16.614	57.670
S2A 50	24078.560	8.720	272.849	3.172	15.746	38.660
S2A 100	43005.065	15.386	310.704	3.697	16.534	78.177
S2B 0-5	19425.130	11.348	282.823	3.008	13.547	41.329
S2B .25	10644.220	8.630	114.115	2.240	8.955	26.322
S2B 50	6516.269	6.058	82.863	1.180	5.122	15.154
S2C 0-5	11297.978	5.478	141.389	3.911	21.276	31.778
S2C 25	9106.083	6.567	121.683	2.265	9.807	18.147
S2C 50	16104.833	5.758	142.370	2.759	13.355	24.971
S2C 100	9632.167	5.630	129.369	3.149	14.953	17.212
S2D 0-5	10252.068	6.786	141.938	2.266	11.179	19.122
S2D 22	12247.847	5.651	150.182	2.656	11.863	17.600



Laboratorio Nacional de Geoquímica y Mineralogía
Universidad Nacional Autónoma de México
Geoquímica Ambiental



muestra	Al	As	Ba	Cd	Cr	Cu
	mg/Kg					
S2E 0-5	9602.726	7.236	142.927	2.554	13.507	21.381
S2E 15-20	9012.578	7.366	120.267	2.258	9.483	14.841
S2F 0-5	12924.008	4.933	191.456	1.899	7.425	18.262
S2G 0-5	13831.131	5.837	144.441	2.821	14.114	22.195
S2G 25	18870.059	7.529	184.623	3.196	15.629	28.909
S2H 0-5	22095.444	5.368	157.331	2.984	14.301	27.041
S2H 25	23093.218	6.520	296.644	3.632	24.171	46.001
S2H 50	28391.995	11.495	312.746	3.585	27.483	38.177
S2I 0-5	20596.027	<LOD	101.155	3.450	17.205	17.030
S2I 25	24453.219	6.993	106.762	3.893	22.917	37.609
S2I 50	27417.448	5.617	126.232	3.830	21.113	32.669

muestra	Fe	Mn	Ni	Pb	Sb	Zn
	mg/Kg					
S2A 0-5	24764.987	726.986	16.982	43.989	<LOD	86.637
S2A .25	25026.177	757.631	16.151	55.201	<LOD	138.546
S2A 50	22191.839	652.176	16.146	25.885	<LOD	76.546
S2A 100	26688.854	1312.947	20.001	39.297	<LOD	110.052
S2B 0-5	21297.100	547.523	15.631	25.143	<LOD	74.242
S2B .25	17941.892	306.889	8.248	13.991	<LOD	47.019
S2B 50	11252.414	193.418	6.084	8.947	<LOD	31.579
S2C 0-5	30733.297	387.994	13.019	19.360	<LOD	61.033
S2C 25	17958.782	300.680	8.856	12.985	<LOD	44.600
S2C 50	18671.167	532.798	11.014	21.110	<LOD	71.231
S2C 100	23058.125	369.249	9.975	17.810	<LOD	51.083
S2D 0-5	18343.545	303.162	9.713	11.766	<LOD	43.416
S2D 22	20822.229	328.815	9.464	13.643	<LOD	45.991
S2E 0-5	20098.075	328.197	10.780	14.112	<LOD	48.692
S2E 15-20	18066.003	345.230	9.309	18.828	<LOD	46.595
S2F 0-5	15499.523	287.169	8.592	9.747	<LOD	42.202
S2G 0-5	20364.340	451.687	10.979	19.344	<LOD	64.450
S2G 25	22791.627	567.581	12.198	23.067	<LOD	70.929



Laboratorio Nacional de Geoquímica y Mineralogía
Universidad Nacional Autónoma de México
Geoquímica Ambiental



muestra	Fe	Mn	Ni	Pb	Sb	Zn
	mg/Kg					
S2H 0-5	21816.482	543.854	11.968	17.884	<LOD	77.677
S2H 25	26007.066	619.964	20.609	24.933	<LOD	78.190
S2H 50	25283.086	699.708	22.249	27.353	<LOD	86.370
S2I 0-5	27669.706	500.954	10.677	10.157	<LOD	56.029
S2I 25	29729.158	525.990	11.590	14.242	<LOD	67.496
S2I 50	29406.478	588.801	12.850	11.047	<LOD	65.383

SAN FRANCISCO-

muestra	Al	As	Ba	Cd	Cr	Cu
	mg/Kg					
S3A-100.0-5	23285.197	<LOD	186.689	3.031	21.007	15.872
S3A-100.25	22544.066	4.580	224.584	2.892	20.299	16.597
S3A-100.50	29331.404	5.889	283.544	3.069	21.915	20.186
S3B-50.0-5	21430.775	8.443	176.446	3.087	27.884	252.556
S3B-50.25	16818.399	9.884	235.320	2.618	25.289	257.808
S3B-50.50	19948.880	9.815	256.910	2.771	19.836	185.644
S3C-10.0-5	16586.518	12.880	151.152	3.212	23.079	150.695
S3C-10.25	8273.139	12.029	207.822	3.771	31.830	133.084
S3C-10.50	15597.925	8.060	263.534	2.731	20.666	142.492
S3D.0-5	15655.346	7.251	251.157	2.603	20.231	93.236
S3D.25	12965.512	8.173	418.887	3.106	26.539	68.182
S3D.50	13157.468	8.428	217.848	2.182	17.267	61.789
S3E.0-5	14961.905	5.737	228.649	2.373	24.709	64.603
S3E.25	23393.679	7.708	256.259	2.943	18.737	63.264
S3E.50	13600.217	8.570	245.994	3.222	28.575	52.543
S3F-10.0-5	29096.983	8.121	284.333	2.981	21.320	50.983
S3F-10.25	12984.531	7.490	188.170	2.593	22.687	41.341
S3F-10.50	10798.622	7.995	246.062	2.660	29.418	42.852
S3G-50.0-5	11405.921	7.041	121.384	1.316	15.941	22.522
S3G-50.25	32247.906	10.029	266.834	3.582	22.884	38.216
S3G-50.50	30820.565	10.015	265.533	3.445	20.647	32.518
S3H-100.0-5	8529.953	7.592	91.037	1.130	9.485	24.009
S3H-100.25	8464.223	5.467	96.241	1.100	7.810	21.802
S3H-100.50	16987.181	6.680	148.981	2.085	14.440	21.984



Laboratorio Nacional de Geoquímica y Mineralogía
Universidad Nacional Autónoma de México
Geoquímica Ambiental



muestra	Al	As	Ba	Cd	Cr	Cu
	mg/Kg					
S3I-100.0-5	22362.210	8.548	334.030	3.244	26.651	26.415
S3I-100.25	7548.202	4.924	104.150	1.384	10.784	17.886
S3I-100.50	8407.151	6.908	118.813	1.172	9.616	16.840

muestra	Fe	Mn	Ni	Pb	Sb	Zn
	mg/Kg					
S3A-100.0-5	22959.704	489.927	14.463	17.428	<LOD	63.445
S3A-100.25	21501.398	528.320	16.535	11.514	<LOD	59.065
S3A-100.50	24141.624	608.252	16.751	12.639	<LOD	69.081
S3B-50.0-5	22255.386	475.976	18.134	19.857	<LOD	72.845
S3B-50.25	18716.755	390.898	17.642	15.308	<LOD	52.136
S3B-50.50	19264.293	449.109	14.223	22.611	<LOD	58.193
S3C-10.0-5	25079.271	471.518	11.282	30.125	<LOD	52.939
S3C-10.25	29170.892	437.300	10.643	31.732	<LOD	42.987
S3C-10.50	18822.691	404.472	13.529	16.799	<LOD	50.801
S3D.0-5	18713.634	390.611	11.910	15.406	<LOD	51.933
S3D.25	21531.005	457.833	15.743	30.848	<LOD	49.803
S3D.50	15999.093	355.053	11.395	14.827	<LOD	39.219
S3E.0-5	16947.759	365.111	18.786	13.360	<LOD	47.131
S3E.25	19296.357	448.262	13.200	16.226	<LOD	55.557
S3E.50	23050.381	396.721	12.100	23.512	<LOD	49.389
S3F-10.0-5	20902.827	522.560	15.410	17.152	<LOD	67.464
S3F-10.25	19131.084	338.909	11.234	24.070	<LOD	45.215
S3F-10.50	19564.490	345.983	17.497	29.029	<LOD	47.271
S3G-50.0-5	11231.102	377.144	10.197	10.015	<LOD	31.030
S3G-50.25	25581.260	710.782	18.292	16.033	<LOD	79.801
S3G-50.50	23975.273	690.367	17.283	16.078	<LOD	95.645
S3H-100.0-5	10222.357	303.666	7.047	16.290	<LOD	32.960
S3H-100.25	9639.329	279.776	6.240	8.380	<LOD	30.472
S3H-100.50	15998.607	391.076	10.632	14.134	<LOD	44.646
S3I-100.0-5	22539.652	526.037	18.171	17.652	<LOD	60.500
S3I-100.25	12100.087	344.851	7.843	10.413	<LOD	32.033
S3I-100.50	10220.938	378.286	7.704	14.447	<LOD	32.832



CONTROL DE CALIDAD

En el caso de los análisis determinados por ICP-OES la concentración de cada elemento fue determinada por triplicado, el valor reportado es el promedio de las tres determinaciones, la desviación estándar relativa (RSD) de las mediciones fue menor al 10%.

Para determinar la exactitud se utilizaron estándares de control analítico de concentraciones conocidas (5 y 50 ppm) los cuales fueron analizados como muestra para determinar su concentración por medio de curvas de calibración preparadas, indicando un buen desempeño del método de análisis.

% exactitud	Al	As	Ba	Cd	Cr	Cu	Fe	Mn	Ni	Pb	Sb	Zn
50 ppm	102.22	94.43	104.70	92.82	96.91	102.49	99.57	98.05	92.13	98.13	95.71	92.63
5 ppm	100.42	102.39	104.25	108.92	103.41	94.37	105.81	107.11	109.38	109.66	102.16	108.74

Sin mas por al momento quedo a sus ordenes.

Analista:

QFB. Fabiola Vega García

M en C Alicia Santana Silva

Responsable técnico: M en C Luis Gerardo Martínez Jardines

APÉNDICE DE LABORATORIO 2

**Informe de laboratorio del muestreo Realizado en
Noviembre de 2015**

**Resultados en muestras de agua
superficial y subterránea en la
Cuenca del Río San Miguel, para
determinar valores de fondo**



INFORME DE RESULTADOS

AGUA SUPERFICIAL Y SUBTERRANEA SAN MIGUEL

Datos del solicitante:

Dr. Francisco Martín Romero

correo electrónico: fmrch@geologia.unam.mx, fmrch@hotmail.com

Dirección: Instituto de Geología, UNAM. Teléfono: 56224386 ext 129

Información de las muestras

Fecha de recepción de muestras: 24 de noviembre del 2015

Información de los análisis

En las 42 muestras se determinaron elementos traza solubles y totales por Espectrometría de Emisión Óptica con Plasma Inductivamente Acopiado (ICP-OES) equipo Pekin Elmer serie 8300. Modo de inyección : Camara ciclónica.

LD mg/L	Al	As	Ba	Cd	Cr	Cu	Fe	Mn	Ni	Pb	Sb	Zn
	0.08	0.07	0.01	0.02	0.003	0.122	0.01	0.007	0.01	0.03	0.1	0.007

El pH se determino con un potenciómetro Hanna Instruments, HI-98185 y se siguió el método estandarizado 9040 C de la US-EPA .

Conductividad eléctrica (CE) se determino con un conductímetro OAKTON Con 700. y se siguió el método APHA 1992. Standard methods for the examination of water and wastewater

Se determine cromatografía iónica para elementos mayores en un cromatografo 883 Basic IC Plus marca Metrohm.

LD	F-	Cl-	NO3-	SO4 2-	Na ⁺	K ⁺	Ca ²⁺	Mg ²⁺
ppm	0.06	0.07	0.1	0.1	0.4	0.3	0.4	0.2

Lista de muestras:

SUPERFICIAL:

ID/MUESTRA	SITIO	X	Y
SMS-1A	Mina Santa Gertrudis	543627	3392790
SMS-6A	Cucurpe	527170	3350061
SMS-8A	Rio San Miguel (rodeo)	529900	3328375
SMS-9A	San Juan	532607	3319345
SMS-10A	Opodepe	536075	3309764
SMS-12A	Rayón	540683	3290968
SMS-13A	La Jola	541488	3280308



Laboratorio Nacional de Geoquímica y Minerología
Universidad Nacional Autónoma de México
Geoquímica Ambiental



ID/MUESTRA	SITIO	X	Y
SMS-14A	San Miguel de Horcasitas	542117	3272813
SMS-15A	San Miguel	525978	3262931
SMS-16A	San Miguel de Horcasitas	526023	3263020
SMS-17A	Fabrica los Ángeles	522413	3256324
SMS-18A	Ejido La Labor	516581	3247466

SUBTERRANEAS:

ID/MUESTRA	SITIO	X	Y
SMM-01	Mina Santa Gertrudis	527406	3368784
SMN-02	Mina Santa Gertrudis	528932	3377119
SMN-03	Cucurpe	527547	3349730
SMN-04	Cucurpe	526134	3343826
SMN-05	Merecichic	531225	3321905
SMN-06	Opodepe	535632	3310893
SMN-07	San Rafael	540791	3297508
SMN-08	San Rafael	540767	3299171
SMN-09	Rancho la Palma	540816	3295015
SMN-10	---	541412	3292112
SMN-11	Rayón	541507	3290572
SMN-13	Rayón	541535	3287821
SMN-14	Rayón	541318	3287375
SMN-15	San Miguel de Horcasitas	526215	3260807
SMN-16	Codorachi	520118	3252673
SMN-17	El Alamito	514848	3235381
SMN-19	Real del Alamito	512029	3231266
SMN-20	El Tronconal	513221	3228527
SMN-28	Frac Real del Alamito	513605	3234202
SMA-23	El Tronconal	514287	3226910
SMA-38A	Ejido La labor	518099	3246123
SMA-39	San Pedro	512880	3229738
SMA-40	El Tronconal	514140	3227332
SMPS-26A	Ejido El Carmen	516921	3243847



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Universidad Nacional Autónoma de México
Geoquímica Ambiental



ID/MUESTRA	SITIO	X	Y
SMPS-26A	Ejido El Carmen	516921	3243847
SMPS-27	Frac el Alamito sec 1	513469	3235450
SMPS-29	El Saucito	512083	3231810
SMPS-30	El Tronconal	513560	3231259
SMPS-32	San Pedro	512410	3229382
SMPS-35	San Pedro	513960	3227640
SMPP-24	La Victoria	512106	3221253

RESULTADOS pH y CE:

Muestra	Sitio	pH	CE ($\mu\text{S}/\text{cm}$)	Muestra	Sitio	pH	CE ($\mu\text{S}/\text{cm}$)
SMS-1A	Mina Santa Gertrudis	7.67	616	SMS-13A	La Jola	8.26	668
SMS-6A	Cucurpe	8.07	577	SMS-14A	San Miguel de Horcasitas	8.2	668
SMS-8A	Rio San Miguel (rodeo)	8.11	577	SMS-15A	San Miguel	8.06	682
SMS-9A	San Juan	8	587	SMS-16A	San Miguel de Horcasitas	8.21	632
SMS-10A	Opodepe	8.13	565	SMS-17A	Fabrica los Angeles	8.02	743
SMS-12A	Rayon	8.01	680	SMS-18A	Ejido La Labor	8.05	685



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 Universidad Nacional Autónoma de México
 Geoquímica Ambiental



Muestra	Sitio	pH	CE ($\mu\text{S}/\text{cm}$)	Muestra	Sitio	pH	CE ($\mu\text{S}/\text{cm}$)
SMM-01	Mina Santa Gertrudis	8	299	SMN-17	El Alamito	7.22	669
SMN-02	Mina Santa Gertrudis	7.24	456	SMN-19	Real del Alamito	7.42	573
SMN-03	Cucurpe	7.47	705	SMN-20	El Tronconal	7.97	488
SMN-04	Cucurpe	7.84	605	SMN-28	Frac Real del Alamito	7.23	929
SMN-05	Merecichic	7.34	567	SMA-23	El Tronconal	7.81	1100
SMN-06	Opodepe	7.69	610	SMA-38A	Ejido La labor	7.63	887
SMN-07	San Rafael	7.36	659	SMA-39	San Pedro	8.71	492
SMN-08	San Rafael	7.44	664	SMA-40	El Tronconal	7.76	1265
SMN-09	Rancho la Palma	7.64	667	SMPS-26A	Ejido El Carmen	7.52	817
SMN-10	---	7.51	894	SMPS-27	Frac el Alamito sec 1	7.41	836
SMN-11	Rayon	7.56	835	SMPS-29	El Saucito	7.77	584
SMN-13	Rayon	7.45	668	SMPS-30	El Tronconal	7.58	760
SMN-14	Rayon	7.52	584	SMPS-32	San Pedro	8.53	718
SMN-15	San Miguel de Horcasitas	7.38	741	SMPS-35	San Pedro	7.7	1188
SMN-16	Codorachi	8.04	947	SMPP-24	La Victoria	8.23	684

RESULTADOS DE CROMATOGRAFIA:

Muestra	Sitio	Concentración en ppm								
		Cationes				Aniones				
		Na ⁺	K ⁺	Ca ²⁺	Mg ²⁺	F ⁻	Cl ⁻	NO ₃ ⁻	SO ₄ ²⁻	HCO ₃ ⁻
SMS-1A	Mina Santa Gertrudis	22.33	2.38	83.70	23.05	0.14	8.11	0.00	44.18	319.00
SMS-6A	Cucurpe	27.77	4.08	82.90	13.82	0.22	8.92	7.39	65.98	268.00
SMS-8A	Rio San Miguel (rodeo)	29.69	3.99	80.66	13.19	0.31	8.92	4.75	63.70	279.00
SMS-9A	San Juan	32.53	3.71	88.77	13.69	0.30	8.96	5.79	57.05	270.00
SMS-10A	Opodepe	31.05	3.73	77.31	13.58	0.31	10.47	4.51	57.32	301.00
SMS-12A	Rayon	40.11	5.80	93.10	13.98	0.30	14.03	0.00	94.73	306.00
SMS-13A	La Jola	39.73	4.32	92.83	14.58	0.32	16.23	30.49	90.00	255.00



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Universidad Nacional Autónoma de México
Geoquímica Ambiental



Muestra	Sitio	Concentración en ppm								
		Cationes				Aniones				
		Na ⁺	K ⁺	Ca ²⁺	Mg ²⁺	F ⁻	Cl ⁻	NO ₃ ⁻	SO ₄ ²⁻	HCO ₃ ⁻
SMS-14A	San Miguel de Horcasitas	40.79	4.53	90.04	14.43	0.36	18.46	24.96	97.75	290.00
SMS-15A	San Miguel	45.39	6.64	77.74	18.62	0.26	23.98	16.03	114.18	260.00
SMS-16A	San Miguel de Horcasitas	45.11	5.26	70.96	17.33	0.31	23.88	16.60	117.07	235.00
SMS-17A	Fabrica los Angeles	51.87	5.00	88.71	16.71	0.39	25.65	27.29	105.70	273.00
SMS-18A	Ejido La Labor	55.03	5.02	71.81	17.79	0.33	27.29	23.08	105.95	238.00

Muestra	Sitio	Concentración en ppm								
		Cationes				Aniones				
		Na ⁺	K ⁺	Ca ²⁺	Mg ²⁺	F ⁻	Cl ⁻	NO ₃ ⁻	SO ₄ ²⁻	HCO ₃ ⁻
SMM-01	Mina Santa Gertrudis	36.26	2.57	14.80	6.94	0.33	4.27	2.21	3.61	139.00
SMN-02	Mina Santa Gertrudis	19.84	13.94	58.92	7.09	0.16	19.24	16.86	8.66	227.00
SMN-03	Cucurpe	39.53	6.14	90.42	16.10	0.30	11.30	3.11	94.56	273.00
SMN-04	Cucurpe	31.38	3.84	81.89	13.17	0.32	9.71	7.05	76.10	273.00
SMN-05	Merecichic	25.53	3.35	77.44	11.43	0.29	9.44	5.73	42.40	295.00
SMN-06	Opodepe	34.10	3.34	83.52	13.70	0.36	11.93	5.64	59.04	282.00
SMN-07	San Rafael	44.12	2.23	91.37	10.86	0.39	11.49	10.71	74.18	393.00
SMN-08	San Rafael	42.86	2.80	92.41	12.59	0.39	11.65	12.35	75.63	306.00
SMN-09	Rancho la Palma	41.07	5.52	96.49	6.82	0.26	24.91	40.09	59.08	284.00
SMN-10	---	63.90	2.47	102.10	10.64	0.40	26.81	36.85	88.08	443.00
SMN-11	Rayon	69.08	3.85	79.04	11.08	0.54	25.43	18.71	124.18	377.00
SMN-13	Rayon	54.91	2.32	81.24	10.57	0.39	18.17	25.01	79.32	270.00
SMN-14	Rayon	30.73	3.78	78.16	11.05	0.52	12.63	35.95	49.26	237.00
SMN-15	San Miguel de Horcasitas	54.91	4.99	89.71	13.48	0.38	57.56	0.00	58.78	301.00
SMN-16	Codorachi	72.14	5.18	116.05	21.62	0.45	39.04	17.78	151.51	337.00
SMN-17	El Alamito	62.18	3.45	59.21	8.06	0.34	28.07	17.95	75.97	276.00
SMN-19	Real del Alamito	65.57	3.18	51.92	9.78	0.55	9.05	27.55	46.51	285.00
SMN-20	El Tronconal	70.61	2.92	30.37	5.21	0.63	10.37	25.50	36.76	210.00
SMN-28	Frac Real del Alamito	77.57	4.09	108.97	16.83	0.41	57.57	10.71	96.67	369.00
SMA-23	El Tronconal	175.67	4.00	65.28	3.85	3.77	61.13	4.38	509.82	64.00
SMA-38A	Ejido La labor	73.68	4.38	107.54	14.31	0.32	41.97	18.31	124.91	342.00
SMA-39	San Pedro	104.90	1.34	6.90	0.64	2.79	50.42	3.91	51.67	139.00
SMA-40	El Tronconal	179.71	7.27	92.17	12.05	2.44	94.22	40.16	405.18	32.00
SMPS-26A	Ejido El Carmen	73.80	4.20	98.59	13.00	0.32	43.91	26.45	114.82	301.00



Muestra	Sitio	Concentración en ppm								
		Cationes				Aniones				
		Na ⁺	K ⁺	Ca ²⁺	Mg ²⁺	F ⁻	Cl ⁻	NO ₃ ⁻	SO ₄ ²⁻	HCO ₃ ⁻
SMPS-27	Frac el Alamito sec 1	68.95	4.80	87.87	11.29	0.22	44.25	30.29	109.94	306.00
SMPS-29	El Saucito	105.91	2.91	29.92	1.72	1.21	33.25	7.74	58.27	246.00
SMPS-30	El Tronconal	92.12	3.61	69.28	11.21	0.67	31.49	33.76	92.52	322.00
SMPS-32	San Pedro	147.99	1.78	7.53	0.36	2.24	99.60	15.06	101.73	137.00
SMPS-35	San Pedro	186.73	4.75	74.16	8.80	3.03	88.96	39.75	359.48	137.00
SMPP-24	La Victoria	130.50	1.76	10.07	1.03	2.62	39.76	6.57	130.22	188.00

RESULTADOS ICP:

Muestra	Sitio	Al		As		Ba		Cd	
		mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
		solubles	totales	solubles	totales	solubles	totales	solubles	totales
SMS-1A	Mina Santa Gertrudis	0.004	0.011	<LOD	<LOD	0.134	0.137	<LOD	<LOD
SMS-6A	Cucurpe	0.100	1.221	0.017	0.016	0.059	0.087	<LOD	<LOD
SMS-8A	Rio San Miguel (rodeo)	<LOD	0.016	0.010	0.010	0.066	0.067	<LOD	<LOD
SMS-9A	San Juan	0.007	0.044	0.007	0.010	0.070	0.071	<LOD	<LOD
SMS-10A	Opodepe	0.012	0.069	0.007	0.009	0.064	0.067	<LOD	<LOD
SMS-12A	Rayon	0.013	0.015	0.008	0.008	0.094	0.097	<LOD	<LOD
SMS-13A	La Jola	0.011	0.072	0.007	0.006	0.083	0.086	<LOD	<LOD
SMS-14A	San Miguel de Horcasitas	0.015	0.137	0.007	0.007	0.090	0.092	<LOD	<LOD
SMS-15A	San Miguel	0.013	0.064	0.006	0.006	0.110	0.106	<LOD	<LOD
SMS-16A	San Miguel de Horcasitas	0.004	0.152	0.007	0.009	0.093	0.095	<LOD	<LOD
SMS-17A	Fabrica los Angeles	0.005	0.109	0.009	0.008	0.090	0.089	<LOD	<LOD
SMS-18A	Ejido La Labor	0.019	0.019	0.008	0.008	0.085	0.081	<LOD	<LOD



Laboratorio Nacional de Geoquímica y Minerología
Universidad Nacional Autónoma de México
Geoquímica Ambiental



Muestra	Sitio	Cr		Cu		Fe		Mn	
		mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
		solubles	totales	solubles	totales	solubles	totales	solubles	totales
SMS-1A	Mina Santa Gertrudis	<LOD	<LOD	<LOD	<LOD	0.008	0.015	0.001	0.001
SMS-6A	Cucurpe	0.001	0.002	<LOD	<LOD	0.098	0.815	0.006	0.111
SMS-8A	Rio San Miguel (rodeo)	<LOD	<LOD	<LOD	<LOD	0.005	0.016	0.006	0.008
SMS-9A	San Juan	<LOD	<LOD	<LOD	<LOD	0.014	0.042	0.010	0.019
SMS-10A	Opodepe	<LOD	<LOD	<LOD	<LOD	0.011	0.056	0.004	0.010
SMS-12A	Rayon	<LOD	<LOD	<LOD	<LOD	0.006	0.011	0.011	0.013
SMS-13A	La Jola	<LOD	<LOD	<LOD	<LOD	0.014	0.072	0.007	0.021
SMS-14A	San Miguel de Horcasitas	<LOD	<LOD	<LOD	<LOD	0.020	0.126	0.010	0.038
SMS-15A	San Miguel	<LOD	<LOD	<LOD	<LOD	0.014	0.041	0.020	0.028
SMS-16A	San Miguel de Horcasitas	<LOD	<LOD	<LOD	<LOD	0.008	0.119	0.018	0.042
SMS-17A	Fabrica los Angeles	<LOD	<LOD	<LOD	<LOD	0.007	0.095	0.004	0.023
SMS-18A	Ejido La Labor	<LOD	<LOD	<LOD	<LOD	0.011	0.018	0.001	0.002

Muestra	Sitio	Ni		Pb		Sb		Zn	
		mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
		solubles	totales	solubles	totales	solubles	totales	solubles	totales
SMS-1A	Mina Santa Gertrudis	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
SMS-6A	Cucurpe	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.012	0.012
SMS-8A	Rio San Miguel (rodeo)	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.006	0.019
SMS-9A	San Juan	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
SMS-10A	Opodepe	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
SMS-12A	Rayon	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
SMS-13A	La Jola	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
SMS-14A	San Miguel de Horcasitas	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
SMS-15A	San Miguel	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
SMS-16A	San Miguel de Horcasitas	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
SMS-17A	Fabrica los Angeles	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
SMS-18A	Ejido La Labor	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD



Laboratorio Nacional de Geoquímica y Minerología
Universidad Nacional Autónoma de México
Geoquímica Ambiental



Muestra	Sitio	Al		As		Ba		Cd	
		mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
		solubles	totales	solubles	totales	solubles	totales	solubles	totales
SMM-01	Mina Santa Gertrudis	0.006	0.005	0.034	0.033	0.001	0.001	<LOD	<LOD
SMN-02	Mina Santa Gertrudis	0.005	0.021	<LOD	<LOD	0.094	0.092	<LOD	<LOD
SMN-03	Cucurpe	0.011	0.043	0.012	0.011	0.086	0.086	<LOD	<LOD
SMN-04	Cucurpe	0.006	0.018	0.013	0.014	0.036	0.036	<LOD	<LOD
SMN-05	Merecichic	0.007	0.007	0.009	0.009	0.062	0.064	<LOD	<LOD
SMN-06	Opodepe	<LOD	0.005	0.007	0.007	0.067	0.071	<LOD	<LOD
SMN-07	San Rafael	0.004	0.008	<LOD	<LOD	0.072	0.077	<LOD	<LOD
SMN-08	San Rafael	0.005	0.009	0.004	0.004	0.081	0.080	<LOD	<LOD
SMN-09	Rancho la Palma	0.006	0.006	<LOD	<LOD	0.049	0.050	<LOD	<LOD
SMN-10	---	<LOD	0.136	<LOD	<LOD	0.065	0.079	<LOD	<LOD
SMN-11	Rayon	0.006	0.006	0.008	0.007	0.064	0.060	<LOD	<LOD
SMN-13	Rayon	0.004	0.040	0.005	0.005	0.078	0.079	<LOD	<LOD
SMN-14	Rayon	0.004	0.005	<LOD	<LOD	0.102	0.100	<LOD	<LOD
SMN-15	San Miguel de Horcasitas	0.005	0.016	0.004	0.006	0.076	0.076	<LOD	<LOD
SMN-16	Codorachi	0.005	0.008	0.010	0.010	0.098	0.102	<LOD	<LOD
SMN-17	El Alamito	0.005	0.005	0.009	0.008	0.123	0.131	<LOD	<LOD
SMN-19	Real del Alamito	0.005	0.004	0.017	0.017	0.055	0.055	<LOD	<LOD
SMN-20	El Tronconal	<LOD	0.010	0.030	0.032	0.027	0.027	<LOD	<LOD
SMN-28	Frac Real del Alamito	0.004	0.017	0.008	0.007	0.109	0.109	<LOD	<LOD
SMA-23	El Tronconal	<LOD	0.017	0.029	0.033	0.020	0.020	<LOD	<LOD
SMA-38A	Ejido La labor	0.006	0.006	0.010	0.009	0.127	0.120	<LOD	<LOD
SMA-39	San Pedro	0.009	0.020	0.035	0.033	0.012	0.012	<LOD	<LOD
SMA-40	El Tronconal	<LOD	0.011	0.030	0.029	0.046	0.049	<LOD	<LOD
SMPS-26A	Ejido El Carmen	<LOD	0.034	0.008	0.011	0.144	0.149	<LOD	<LOD
SMPS-27	Frac el Alamito sec 1	0.005	0.005	0.006	0.006	0.095	0.092	<LOD	<LOD
SMPS-29	El Saucito	0.005	0.009	0.027	0.027	0.047	0.046	<LOD	<LOD
SMPS-30	El Tronconal	0.004	0.004	0.017	0.016	0.065	0.066	<LOD	<LOD
SMPS-32	San Pedro	0.007	0.009	0.029	0.027	0.028	0.028	<LOD	<LOD
SMPS-35	San Pedro	<LOD	0.083	0.038	0.037	0.020	0.022	<LOD	<LOD
SMPP-24	La Victoria	0.006	0.006	0.057	0.057	0.010	0.008	<LOD	<LOD



Laboratorio Nacional de Geoquímica y Minerología
 Universidad Nacional Autónoma de México
 Geoquímica Ambiental



Muestra	Sitio	Cr		Cu		Fe		Mn	
		mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
		solubles	totales	solubles	totales	solubles	totales	solubles	totales
SMM-01	Mina Santa Gertrudis	0.008	0.008	<LOD	<LOD	0.010	0.011	<LOD	<LOD
SMN-02	Mina Santa Gertrudis	0.001	0.001	<LOD	0.010	0.011	0.116	0.002	0.007
SMN-03	Cucurpe	0.001	0.002	<LOD	<LOD	0.019	0.050	0.025	0.029
SMN-04	Cucurpe	0.001	0.001	<LOD	<LOD	0.010	0.023	0.003	0.005
SMN-05	Merecichic	0.005	0.005	<LOD	<LOD	0.066	0.066	0.013	0.013
SMN-06	Opodepe	<LOD	0.001	<LOD	<LOD	0.011	0.013	0.001	0.002
SMN-07	San Rafael	<LOD	0.003	<LOD	<LOD	0.008	0.021	0.002	0.006
SMN-08	San Rafael	0.001	0.002	<LOD	<LOD	0.011	0.020	0.002	0.002
SMN-09	Rancho la Palma	<LOD	<LOD	<LOD	<LOD	0.012	0.010	0.001	0.001
SMN-10	---	<LOD	<LOD	<LOD	<LOD	0.008	0.058	0.015	0.032
SMN-11	Rayon	<LOD	<LOD	<LOD	<LOD	0.022	0.022	0.108	0.120
SMN-13	Rayon	<LOD	0.001	<LOD	<LOD	0.008	0.033	0.003	0.005
SMN-14	Rayon	<LOD	<LOD	<LOD	<LOD	0.063	0.387	0.011	0.012
SMN-15	San Miguel de Horcasitas	<LOD	<LOD	<LOD	<LOD	0.011	0.020	0.004	0.007
SMN-16	Codorachi	<LOD	<LOD	<LOD	<LOD	0.012	0.017	0.002	0.002
SMN-17	El Alamito	<LOD	<LOD	<LOD	<LOD	0.008	0.010	<LOD	<LOD
SMN-19	Real del Alamito	0.001	0.001	<LOD	<LOD	0.011	0.010	0.001	0.001
SMN-20	El Tronconal	0.001	0.001	<LOD	<LOD	0.011	0.540	0.001	0.026
SMN-28	Frac Real del Alamito	<LOD	0.001	<LOD	<LOD	0.010	0.021	0.002	0.002
SMA-23	El Tronconal	0.006	0.009	<LOD	<LOD	0.023	0.187	0.003	0.003
SMA-38A	Ejido La labor	0.002	0.002	<LOD	0.013	0.026	0.044	0.002	0.002
SMA-39	San Pedro	0.020	0.019	<LOD	0.010	0.045	0.144	0.001	0.002
SMA-40	El Tronconal	0.005	0.006	<LOD	0.009	0.014	0.101	0.002	0.003
SMPS-26A	Ejido El Carmen	0.002	0.002	<LOD	<LOD	0.008	0.049	<LOD	0.002
SMPS-27	Frac el Alamito sec 1	<LOD	0.001	<LOD	<LOD	0.012	0.011	<LOD	<LOD
SMPS-29	El Saucito	0.004	0.004	0.022	0.022	0.016	0.047	0.001	0.001
SMPS-30	El Tronconal	0.001	0.001	<LOD	<LOD	0.011	0.016	0.001	0.001
SMPS-32	San Pedro	0.013	0.013	<LOD	<LOD	0.010	0.011	<LOD	<LOD
SMPS-35	San Pedro	0.009	0.009	<LOD	0.010	0.011	0.232	0.002	0.010
SMPP-24	La Victoria	0.006	0.006	<LOD	<LOD	0.012	0.012	<LOD	<LOD



Laboratorio Nacional de Geoquímica y Minerología
Universidad Nacional Autónoma de México
Geoquímica Ambiental



Muestra	Sitio	Ni		Pb		Sb		Zn	
		mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
		solubles	totales	solubles	totales	solubles	totales	solubles	totales
SMM-01	Mina Santa Gertrudis	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
SMN-02	Mina Santa Gertrudis	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.027	0.027
SMN-03	Cucurpe	<LOD	<LOD	<LOD	0.003	<LOD	<LOD	0.351	0.351
SMN-04	Cucurpe	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.018	0.019
SMN-05	Merecichic	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.004	0.004
SMN-06	Opodepe	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.003
SMN-07	San Rafael	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.015
SMN-08	San Rafael	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.011	0.016
SMN-09	Rancho la Palma	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
SMN-10	---	0.002	0.002	<LOD	<LOD	<LOD	<LOD	0.008	0.055
SMN-11	Rayon	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
SMN-13	Rayon	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.003	0.003
SMN-14	Rayon	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.043	0.041
SMN-15	San Miguel de Horcasitas	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
SMN-16	Codorachi	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
SMN-17	El Alamito	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
SMN-19	Real del Alamito	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.006	0.006
SMN-20	El Tronconal	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.151	0.156
SMN-28	Frac Real del Alamito	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
SMA-23	El Tronconal	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.061	0.061
SMA-38A	Ejido La labor	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.011	0.011
SMA-39	San Pedro	0.001	0.006	<LOD	<LOD	<LOD	<LOD	0.004	0.007
SMA-40	El Tronconal	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
SMPS-26A	Ejido El Carmen	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
SMPS-27	Frac el Alamito sec 1	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
SMPS-29	El Saucito	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.017	0.017
SMPS-30	El Tronconal	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
SMPS-32	San Pedro	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
SMPS-35	San Pedro	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
SMPP-24	La Victoria	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD



Laboratorio Nacional de Geoquímica y Minerología
Universidad Nacional Autónoma de México
Geoquímica Ambiental



CONTROL DE CALIDAD

En el caso de los análisis determinados por ICP-OES la concentración de cada elemento fue determinada por triplicado, el valor reportado es el promedio de las tres determinaciones reportando una desviación estándar relativa (RSD) menor al 10%.

Para determinar la exactitud se utilizaron estándares de control analítico de concentraciones conocidas (5 y 50 ppm) los cuales fueron analizados como muestra para determinar su concentración por medio de curvas de calibración preparadas, indicando un buen desempeño del método de análisis.

% exactitud	Al	As	Ba	Cd	Cr	Cu	Fe	Mn	Ni	Pb	Sb	Zn
50 ppm	102.65	100.03	99.54	98.43	102.04	105.7	100.63	97.97	98.71	96.76	98.65	99.43
5 ppm	103.25	104.45	100.14	101.9	103.9	99.45	98.43	101.23	102.76	99.65	101.43	101.43

Para cromatografía se utilizaron estándares de concentraciones conocidas y se analizaron como muestras obteniendo las siguientes exactitudes.

% exactitud cationes	Na ⁺	K ⁺	Ca ²⁺	Mg ²⁺
15 ppm	99.3	98.4	101.8	103.7

% exactitud aniones	F ⁻	Cl ⁻	NO ₃ ⁻	SO ₄ ²⁻
10 ppm	97.08	100.7	102.9	103.9
1 ppm	102.56	97.06	93.02	96.4

Sin mas por al momento quedo a sus ordenes.

Analista:

QFB. Fabiola Vega García

M en C Alicia Santana Silva

QA Daniel Ramos Perez

Responsable técnico: M en C Luis Gerardo Martínez Jardines

APÉNDICE DE LABORATORIO 3

**Informe de laboratorio del muestreo Realizado en
Noviembre de 2015**

**Resultados en muestras de agua
superficial y subterránea en la
Cuenca del Río Sonora**



INFORME DE RESULTADOS

POZOS Y AGUA SUPERFICIAL DE RIO BACANUCHI Y RIO SONORA

Datos del solicitante:

Dr. Francisco Martín Romero correo electrónico: fmrch@geologia.unam.mx, fmrch@hotmail.com

Dirección: Instituto de Geología, UNAM. Teléfono: 56224386 ext 129

Información de las muestras

Fecha de recepción de muestras: 4 de diciembre del 2015

Información de los análisis

En las 56 muestras se determinaron elementos traza solubles y totales por Espectrometría de Emisión Óptica con Plasma Inductivamente Acoplado (ICP-OES) equipo Pekin Elmer serie 8300. Modo de inyección : Camara ciclónica.

LD mg/L	Al	As	Ba	Cd	Cr	Cu	Fe	Mn	Ni	Pb	Sb	Zn
	0.08	0.07	0.01	0.02	0.003	0.122	0.01	0.007	0.01	0.03	0.1	0.007

El pH se determino con un potenciómetro Hanna Instruments, HI-98185 y se siguió el método estandarizado 9040 C de la US-EPA .

Conductividad eléctrica (CE) se determino con un conductímetro OAKTON Con 700. y se siguió el método APHA 1992. Standard methods for the examination of water and wastewater

Se determine cromatografía Iónica para elementos mayores en un cromatógrafo 883 Basic IC Plus marca Metrohm.

LD	F-	Cl-	NO ₃ -	SO ₄ 2-	Na ⁺	K ⁺	Ca ²⁺	Mg ²⁺
ppm	0.06	0.07	0.1	0.1	0.4	0.3	0.4	0.2

Lista de muestras:

Muestra	Sitio	X	Y	Muestra	Sitio	X	Y
MET 001	Bacanuchi-Pozo	572840	3386793	MET 011	Bamori-Pozo	577939	3351820
MET 002	El Molino-Rio	573333	3384340	MET 012	Bamori- Rio	578223	3352033
MET 003	La Trampa-Rio	574726	3382842	MET 013	Sinoquipe- Pozo	572752	3336619
MET 006	Tahuichopa- Rio	581024	3360416	MET 014	Sinoquipe- Rio	572803	3336654
MET 007	Tahuichopa- Pozo	580923	3360455	MET 016	Banamichi- Pozo	575261	3320902
MET 008	Arizpe- pozo 2	580642	3356882	MET 017	Las delicias- Pozo	575405	3316669
MET 009	Arizpe- Rio	580438	3356182	MET 019	Huepac- pozo	575447	3309275
MET 010	Arizpe- pozo 3	580990	3357571	MET 020	Huepac- Rio	575025	3309460



Laboratorio Nacional de Geoquímica y Minerología
Universidad Nacional Autónoma de México
Geoquímica Ambiental



Muestra	Sitio	X	Y	Muestra	Sitio	X	Y
MET 021	Ranchito huepac-pozo	575419	3306238	MET 045	San Rafael de Ures- R.S	551220	3250148
MET 022	Ranchito huepac-Rio	574806	3006214	MET 046	San Jose de Gracia-pozo	537680	3240308
MET 024	Aconchi- Rio	573730	3299526	MET 047	San Jose de Gracia-Rio	537700	3240241
MET 025	La Estancia- Rio Sonora	575817	3296555	MET 051	El Molinito- Pozo	523421	3230543
MET 026	La Estancia- Rio Sonora	575900	3295635	MET 053	El oregano- Rio sonora	539600	3242392
MET 027	San jose de Baviacora- pozo	578610	3290975	MET 054	El Gavilan- Rio Sonora	544790	3243892
MET 028	San Jose de Baviacora- R.S	578300	3290571	MET 076	La Aurora- Pozo 1	584330	3272234
MET 029	Mazocahui- Rio Sonora	585200	3267357	MET 078	La Labor- pozo	584360	3276613
MET 030	Puerta del Sol- Rio Sonora	569980	3259523	MET 080	El Molinote- Pozo	583710	3280305
MET 031	La Puerta del Sol-Pozo	569910	3258490	MET 081	La Capilla- Pozo	582730	3282740
MET 032	Mazocahui-Pozo	585620	3267732	MET 083	Baviacora- Pozo 1	580590	3287425
MET 034	San Pedro de Ures-Pozo	561150	3255588	MET 084	Baviacora- Pozo 2	580390	3287407
MET 036	Ures-Pozo	559030	3255916	MET 085	Baviacora- Pozo 3	580420	3288333
MET 037	Ures Santiago-Pozo	557010	3256467	MET 088	San Pablo-pozo	577210	3293977
MET 039	Baviacora- Rio Sonora	580090	3289503	MET 091	San Felipe -Rio	574524	3308129
MET 040	La Capilla- Rio Sonora	582420	3282568	MET 099	La Aurora- pozo 2	584050	3272407
MET 041	El molinote- Rio Sonora	583570	3280425	MET 110	Topahue- Pozo	536000	3237455
MET 042	La Aurora- Rio Sonora	584190	3272288	MET 112	San Rafael de Ures-pozo	551520	3249429
MET 043	La Labor- Rio Sonora	584300	3276557	MET 113	Guadalupe de Ures-pozo	552990	3251067
MET 044	Guadalupe de Ures- rio Sonora	552710	3251690	MET BAVI POZO 4	Baviacora- Pozo 4	581790	3287343

RESULTADOS pH y CE:

Muestra	Sitio	pH	CE ($\mu\text{s}/\text{cm}$)	Muestra	Sitio	pH	CE ($\mu\text{s}/\text{cm}$)
MET 001	Bacanuchi-Pozo	7.47	697	MET 008	Arizpe- pozo 2	7.46	741
MET 002	El Molino-Rio	8	745	MET 009	Arizpe- Rio	7.63	772
MET 003	La Trampa-Rio	7.96	702	MET 010	Arizpe- pozo 3	8.24	717
MET 006	Tahuichopa- Rio	7.8	704	MET 011	Bamori-Pozo	7.29	683
MET 007	Tahuichopa- Pozo	7.34	757	MET 012	Bamori- Rio	8.17	701



Laboratorio Nacional de Geoquímica y Minerología
Universidad Nacional Autónoma de México
Geoquímica Ambiental



Muestra	Sitio	pH	CE ($\mu\text{s}/\text{cm}$)	Muestra	Sitio	pH	CE ($\mu\text{s}/\text{cm}$)
MET 013	Sinoquipe- Pozo	7.53	732	MET 042	La Aurora- Rio Sonora	8.15	1008
MET 014	Sinoquipe- Rio	8.22	654	MET 043	La Labor- Rio Sonora	8.12	1016
MET 016	Banamichi- Pozo	7.46	666	MET 044	Guadalupe de Ures- rio Sonora	7.92	1260
MET 017	Las delicias- Pozo	7.5	668	MET 045	San Rafael de Ures- R.S	7.84	1238
MET 019	Huepac- pozo	7.21	998	MET 046	San Jose de Gracia-pozo	7.42	1307
MET 020	Huepac- Rio	8.02	818	MET 047	San Jose de Gracia-Rio	7.99	1274
MET 021	Ranchito huepac-pozo	7.31	1108	MET 051	El Molinito- Pozo	7.49	932
MET 022	Ranchito huepac-Rio	8.36	697	MET 053	El oregano- Rio sonora	8.09	1341
MET 024	Aconchi- Rio	7.87	756	MET 054	El Gavilan- Rio Sonora	8.01	1355
MET 025	La Estancia- Rio Sonora	8.22	762	MET 076	La Aurora- Pozo 1	7.45	1054
MET 026	La Estancia- Rio Sonora	8.13	855	MET 078	La Labor- pozo	7.31	1093
MET 027	San jose de Baviacora-pozo	7.12	1176	MET 080	El Molinote- Pozo	7.36	1311
MET 028	San Jose de Baviacora- R.S	8.26	839	MET 081	La Capilla- Pozo	7.38	1233
MET 029	Mazocahui- Rio Sonora	8.16	978	MET 083	Baviacora- Pozo 1	7.17	1158
MET 030	Puerta del Sol- Rio Sonora	8.18	899	MET 084	Baviacora- Pozo 2	7.23	1190
MET 031	La Puerta del Sol-Pozo	7.04	1361	MET 085	Baviacora- Pozo 3	7.17	1148
MET 032	Mazocahui-Pozo	7.58	1642	MET 088	San Pablo-pozo	7.16	1117
MET 034	San Pedro de Ures-Pozo	7.5	505	MET 091	San Felipe -Rio	8.34	672
MET 036	Ures-Pozo	7.24	918	MET 099	La Aurora- pozo 2	7.18	1267
MET 037	Ures Santiago-Pozo	7.11	1151	MET 110	Topahue- Pozo	7.32	1259
MET 039	Baviacora- Rio Sonora	7.64	884	MET 112	San Rafael de Ures-pozo	8.17	567
MET 040	La Capilla- Rio Sonora	7.85	970	MET 113	Guadalupe de Ures-pozo	7.04	1503
MET 041	El molinote- Rio Sonora	7.86	998	MET BAVI POZO 4	Baviacora- Pozo 4	7.49	691



RESULTADOS DE CROMATOGRAFIA:

Muestra	Sitio	Concentracion en ppm								
		Cationes				Aniones				
		Na+	K+	Ca2+	Mg2+	F-	Cl-	NO3-	SO42-	HCO3-
MET 001	Bacanuchi-Pozo	38.03	2.05	73.99	17.74	0.28	6.35	15.56	59.01	382.00
MET 002	El Molino-Rio	25.19	2.14	115.25	15.13	0.16	4.98	9.94	202.23	273.21
MET 003	La Trampa-Rio	24.93	2.05	109.87	14.23	0.17	4.84	8.05	176.29	300.53
MET 006	Tahuichopa- Rio	30.32	3.02	96.70	17.38	0.22	6.52	4.08	205.89	273.21
MET 007	Tahuichopa- Pozo	35.78	3.36	90.30	19.56	0.30	7.54	5.19	180.92	297.00
MET 008	Arizpe- pozo 2	32.75	3.00	104.30	18.49	0.21	7.88	8.76	196.05	262.28
MET 009	Arizpe- Rio	36.46	3.02	105.71	18.84	0.24	7.82	9.25	216.48	267.74
MET 010	Arizpe- pozo 3	47.23	3.24	119.04	15.89	0.23	8.54	5.22	176.14	344.24
MET 011	Bamori-Pozo	35.06	2.48	99.05	15.04	0.27	7.46	1.75	183.55	256.82
MET 012	Bamori- Rio	37.23	3.49	95.77	15.93	0.33	8.90	6.13	193.77	256.82
MET 013	Sinoquipe- Pozo	41.13	3.43	96.57	15.88	0.36	8.96	4.91	199.76	234.96
MET 014	Sinoquipe- Rio	41.60	3.62	80.24	15.66	0.35	8.72	2.45	200.12	207.64
MET 016	Banamichi- Pozo	44.76	3.37	85.37	12.01	0.45	7.97	5.13	147.82	262.28
MET 017	Las delicias- Pozo	37.78	3.18	88.92	13.18	0.35	7.85	8.57	154.41	329.00
MET 019	Huepac- pozo	77.29	3.30	113.71	19.29	0.41	15.15	14.27	290.00	387.96
MET 020	Huepac- Rio	43.83	3.59	111.21	17.11	0.29	10.26	23.79	193.78	316.92
MET 021	Ranchito huepac- pozo	70.41	3.08	149.66	22.50	0.35	22.32	26.16	328.88	366.10
MET 022	Ranchito huepac- Rio	37.72	3.16	87.46	14.53	0.32	8.72	22.19	150.78	245.89
MET 024	Aconchi- Rio	46.58	3.59	98.85	15.18	0.32	10.07	16.62	181.66	284.00
MET 025	La Estancia- Rio Sonora	85.79	9.13	50.16	14.52	0.24	27.60	1.60	241.47	169.39
MET 026	La Estancia- Rio Sonora	59.69	3.82	99.25	16.67	0.35	12.16	13.17	224.37	300.53
MET 027	San jose de Baviacora-pozo	78.70	3.73	131.17	28.71	0.34	26.36	27.36	367.79	420.74
MET 028	San Jose de Baviacora- R.S	57.88	3.90	87.68	16.58	0.39	12.15	13.48	216.56	246.00
MET 029	Mazocahui- Rio Sonora	70.42	4.34	104.31	23.27	0.46	21.40	11.87	308.26	142.07
MET 030	Puerta del Sol- Rio Sonora	71.70	4.66	96.56	23.28	0.43	22.67	9.27	313.78	196.71



Laboratorio Nacional de Geoquímica y Minerología
Universidad Nacional Autónoma de México
Geoquímica Ambiental



Muestra	Sitio	Concentracion en ppm								
		Cationes				Aniones				
		Na+	K+	Ca2+	Mg2+	F-	Cl-	NO3-	SO42-	HCO3-
MET 031	La Puerta del Sol-Pozo	170.47	2.93	113.92	19.86	1.24	136.46	51.91	282.24	284.14
MET 032	Mazocahui-Pozo	146.75	3.72	164.41	55.76	0.56	157.41	11.24	617.67	320.00
MET 034	San Pedro de Ures-Pozo	53.31	1.63	46.16	5.44	5.71	18.80	22.92	42.80	153.00
MET 036	Ures-Pozo	54.01	4.54	119.96	18.21	0.43	22.36	34.31	258.65	256.82
MET 037	Ures Santiago-Pozo	86.52	3.69	143.59	22.49	0.42	38.90	58.58	373.67	234.96
MET 039	Baviacora- Rio Sonora	56.06	3.75	106.75	17.89	0.43	13.41	15.19	232.42	262.28
MET 040	La Capilla- Rio Sonora	61.87	3.80	105.09	20.96	0.43	16.40	14.11	273.15	262.28
MET 041	El molinote- Rio Sonora	64.07	3.88	118.84	21.88	0.42	17.22	13.91	286.48	136.60
MET 042	La Aurora- Rio Sonora	70.11	4.41	110.07	23.41	0.47	20.77	14.77	306.76	273.21
MET 043	La Labor- Rio Sonora	66.44	4.03	100.00	22.58	0.42	18.42	13.24	297.36	289.60
MET 044	Guadalupe de Ures- rio Sonora	78.63	5.61	157.10	28.34	0.31	29.36	19.32	486.31	273.21
MET 045	San Rafael de Ures- R.S	74.27	5.65	175.63	29.25	0.33	31.25	15.61	480.45	224.03
MET 046	San Jose de Gracia-pozo	116.03	6.16	139.36	26.92	0.42	59.83	6.94	529.49	267.74
MET 047	San Jose de Gracia-Rio	128.97	5.98	112.11	30.16	0.41	56.53	5.88	555.06	213.10
MET 051	El Molinito- Pozo	115.97	5.55	71.10	16.39	0.69	38.06	5.73	103.98	409.81
MET 053	El oregano- Rio sonora	127.91	5.79	121.49	30.45	0.42	55.73	6.66	554.14	273.00
MET 054	El Gavilan- Rio Sonora	123.57	5.97	145.86	30.53	0.43	51.80	8.97	540.48	316.92
MET 076	La Aurora- Pozo 1	83.30	6.46	110.39	29.15	0.89	26.25	5.36	324.34	262.28
MET 078	La Labor- pozo	94.21	4.87	109.54	21.81	0.68	48.76	91.51	243.76	284.14
MET 080	El Molinote- Pozo	91.24	5.10	171.40	30.00	0.42	33.64	21.95	437.90	355.17
MET 081	La Capilla- Pozo	84.90	5.54	153.67	31.32	0.45	29.75	22.41	395.13	360.64
MET 083	Baviacora- Pozo 1	73.48	6.95	153.93	29.07	0.30	23.37	11.51	359.18	327.85
MET 084	Baviacora- Pozo 2	70.85	4.56	160.26	29.83	0.36	26.06	20.04	410.97	311.46
MET 085	Baviacora- Pozo 3	74.91	4.33	135.51	24.69	0.34	23.37	24.29	349.32	305.99
MET 088	San Pablo-pozo	74.36	5.83	146.21	23.71	0.32	28.20	15.90	302.12	344.24
MET 091	San Felipe -Rio	37.42	3.26	77.23	14.17	0.30	8.51	18.81	147.06	207.64
MET 099	La Aurora- pozo 2	91.95	4.63	155.72	30.64	0.58	39.58	28.46	413.80	344.24
MET 110	Topahue- Pozo	103.77	6.05	144.18	26.33	0.46	62.39	11.56	481.53	245.89
MET 112	San Rafael de Ures-pozo	118.41	2.20	12.86	1.18	7.79	70.34	1.86	33.33	153.00
MET 113	Guadalupe de Ures-pozo	117.58	7.62	189.72	33.48	0.37	64.79	37.61	574.22	382.49
METBAV pozo 4	Baviacora- Pozo 4	39.39	2.94	72.98	25.76	0.23	7.30	5.20	226.50	224.00



Laboratorio Nacional de Geoquímica y Minerología
 Universidad Nacional Autónoma de México
 Geoquímica Ambiental



RESULTADOS ICP:

Muestra	sitio	Al		As		Ba		Cd	
		mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
		totales	solubles	totales	solubles	totales	solubles	totales	solubles
MET 001	Bacanuchi	<LOD	<LOD	0.006	0.005	0.046	0.043	<LOD	<LOD
MET 002	El Molino	0.011	<LOD	0.004	0.005	0.092	0.085	<LOD	<LOD
MET 003	La Trampa	0.067	0.019	0.005	0.005	0.095	0.072	<LOD	<LOD
MET 006	Tahuichopa- Rio	0.011	0.006	<LOD	<LOD	0.085	0.084	<LOD	<LOD
MET 007	Tahuichopa- Pozo	0.011	<LOD	0.006	0.006	0.066	0.066	<LOD	<LOD
MET 008	Arizpe- pozo 2	0.004	0.004	0.005	0.005	0.128	0.117	<LOD	<LOD
MET 009	Arizpe- Rio	0.014	<LOD	0.004	0.005	0.096	0.093	<LOD	<LOD
MET 010	Arizpe- pozo 3	0.014	<LOD	0.006	0.006	0.089	0.080	<LOD	<LOD
MET 011	Bamori	<LOD	<LOD	0.006	0.005	0.034	0.034	<LOD	<LOD
MET 012	Bamori- Rio	0.070	0.006	0.007	0.007	0.090	0.083	<LOD	<LOD
MET 013	Sinoquipe- Pozo	0.021	<LOD	0.009	0.007	0.125	0.100	<LOD	<LOD
MET 014	Sinoquipe- Rio	0.015	<LOD	0.007	0.007	0.075	0.071	<LOD	<LOD
MET 016	Banamichi- Pozo	0.007	<LOD	0.010	0.010	0.083	0.080	<LOD	<LOD
MET 017	Las delicias- Pozo	0.006	0.006	0.007	0.005	0.107	0.099	<LOD	<LOD
MET 019	Huepac- pozo	0.045	<LOD	0.004	0.005	0.075	0.064	<LOD	<LOD
MET 020	Huepac- Rio	0.014	<LOD	0.005	0.005	0.109	0.098	<LOD	<LOD
MET 021	Ranchito huepac-pozo	<LOD	<LOD	<LOD	<LOD	0.070	0.064	<LOD	<LOD
MET 022	Ranchito huepac-Rio	0.022	<LOD	0.006	0.005	0.099	0.084	<LOD	<LOD
MET 024	Aconchi- Rio	0.066	0.005	0.006	0.005	0.095	0.079	<LOD	<LOD
MET 025	La Estancia- Rio Sonora	0.008	<LOD	<LOD	<LOD	0.037	0.030	<LOD	<LOD
MET 026	La Estancia- Rio Sonora	0.045	0.004	<LOD	<LOD	0.097	0.083	<LOD	<LOD
MET 027	San Jose de Baviacora	<LOD	<LOD	<LOD	<LOD	0.117	0.097	<LOD	<LOD
MET 028	San Jose de Baviacora- R.S	0.165	0.009	<LOD	<LOD	0.098	0.086	<LOD	<LOD
MET 029	Mazocahui- Rio Sonora	0.098	<LOD	<LOD	<LOD	0.101	0.085	<LOD	<LOD
MET 030	Puerta del Sol- Rio Sonora	0.391	<LOD	<LOD	<LOD	0.102	0.075	<LOD	<LOD
MET 031	La Puerta del Sol	0.007	0.004	<LOD	<LOD	0.044	0.039	<LOD	<LOD
MET 032	Mazocahui	0.005	<LOD	<LOD	<LOD	0.040	0.036	<LOD	<LOD



Laboratorio Nacional de Geoquímica y Minerología
Universidad Nacional Autónoma de México
Geoquímica Ambiental



Muestra	sitio	Cr		Cu		Fe		Mn	
		mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
		totales	solubles	totales	solubles	totales	solubles	totales	solubles
MET 001	Bacanuchi	0.002	0.002	<LOD	<LOD	0.007	0.007	<LOD	<LOD
MET 002	El Molino	0.002	0.002	<LOD	<LOD	0.020	0.007	0.011	0.007
MET 003	La Trampa	0.001	0.001	<LOD	<LOD	0.040	0.014	0.016	0.006
MET 006	Tahuichopa- Rio	0.001	0.001	<LOD	<LOD	0.012	0.013	0.005	0.005
MET 007	Tahuichopa- Pozo	0.001	0.001	<LOD	<LOD	0.020	0.006	0.011	0.009
MET 008	Arizpe- pozo 2	0.001	0.001	0.020	0.012	0.027	0.011	0.001	0.000
MET 009	Arizpe- Rio	0.001	0.001	<LOD	<LOD	0.013	0.008	0.004	0.002
MET 010	Arizpe- pozo 3	0.003	0.002	0.009	0.010	0.042	0.018	0.001	0.001
MET 011	Bamori	0.001	0.001	<LOD	<LOD	0.013	0.013	0.001	0.000
MET 012	Bamori- Rio	<LOD	<LOD	<LOD	<LOD	0.033	0.010	0.010	0.003
MET 013	Sinoquipe- Pozo	0.001	0.001	<LOD	<LOD	1.787	0.011	0.052	0.003
MET 014	Sinoquipe- Rio	<LOD	<LOD	<LOD	<LOD	0.012	0.009	0.002	0.001
MET 016	Banamichi- Pozo	0.001	0.001	<LOD	<LOD	0.021	0.005	0.001	0.000
MET 017	Las delicias- Pozo	0.001	0.001	<LOD	<LOD	0.011	0.011	<LOD	<LOD
MET 019	Huepac- pozo	0.001	0.001	<LOD	<LOD	0.062	0.006	0.003	<LOD
MET 020	Huepac- Rio	0.001	0.001	<LOD	<LOD	0.015	0.007	0.003	0.002
MET 021	Ranchito huepac- pozo	0.001	0.001	<LOD	<LOD	0.010	0.010	<LOD	<LOD
MET 022	Ranchito huepac-Rio	0.001	0.001	<LOD	<LOD	0.015	0.006	0.002	0.001
MET 024	Aconchi- Rio	<LOD	<LOD	<LOD	<LOD	0.039	0.007	0.016	0.008
MET 025	La Estancia- Rio Sonora	<LOD	<LOD	<LOD	<LOD	0.485	0.017	0.050	0.033
MET 026	La Estancia- Rio Sonora	<LOD	<LOD	<LOD	<LOD	0.027	0.008	0.009	0.004
MET 027	San jose de Baviacora	0.001	0.001	0.011	0.009	0.009	0.006	<LOD	<LOD
MET 028	San Jose de Baviacora- R.S	<LOD	<LOD	<LOD	<LOD	0.085	0.010	0.020	0.004
MET 029	Mazocahui- Rio Sonora	<LOD	<LOD	<LOD	<LOD	0.052	0.006	0.019	0.007
MET 030	Puerta del Sol- Rio Sonora	<LOD	<LOD	<LOD	<LOD	0.208	0.005	0.067	0.001
MET 031	La Puerta del Sol	<LOD	<LOD	<LOD	<LOD	0.015	0.011	0.002	0.002
MET 032	Mazocahui	<LOD	<LOD	<LOD	<LOD	0.060	0.008	0.046	0.041



Laboratorio Nacional de Geoquímica y Minerología
Universidad Nacional Autónoma de México
Geoquímica Ambiental



Muestra	sitio	Ni		Pb		Sb		Zn	
		mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
		totales	solubles	totales	solubles	totales	solubles	totales	solubles
MET 001	Bacanuchi	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
MET 002	El Molino	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
MET 003	La Trampa	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
MET 006	Tahuichopa- Rio	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
MET 007	Tahuichopa- Pozo	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
MET 008	Arizpe- pozo 2	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.027	0.017
MET 009	Arizpe- Rio	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.004	<LOD
MET 010	Arizpe- pozo 3	0.001	<LOD	<LOD	<LOD	<LOD	<LOD	0.008	0.004
MET 011	Bamori	0.001	<LOD	<LOD	<LOD	<LOD	<LOD	0.077	0.077
MET 012	Bamori- Rio	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
MET 013	Sinoquipe- Pozo	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.063	0.026
MET 014	Sinoquipe- Rio	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
MET 016	Banamichi- Pozo	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
MET 017	Las delicias- Pozo	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
MET 019	Huepac- pozo	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
MET 020	Huepac- Rio	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
MET 021	Ranchito huepac- pozo	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.017	0.017
MET 022	Ranchito huepac-Rio	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
MET 024	Aconchi- Rio	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
MET 025	La Estancia- Rio Sonora	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.015	0.004
MET 026	La Estancia- Rio Sonora	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
MET 027	San jose de Baviacora	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.007	0.004
MET 028	San Jose de Baviacora- R.S	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
MET 029	Mazocahui- Rio Sonora	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
MET 030	Puerta del Sol- Rio Sonora	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
MET 031	La Puerta del Sol	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.106	0.092
MET 032	Mazocahui	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.027	0.024



Laboratorio Nacional de Geoquímica y Minerología
 Universidad Nacional Autónoma de México
 Geoquímica Ambiental



Muestra	sitio	Al		As		Ba		Cd	
		mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
		totales	solubles	totales	solubles	totales	solubles	totales	solubles
MET 034	San Pedro de Ures	0.016	0.009	<LOD	<LOD	0.130	0.108	<LOD	<LOD
MET 036	Ures	0.015	0.004	<LOD	<LOD	0.091	0.093	<LOD	<LOD
MET 037	Ures Santiago	<LOD	<LOD	<LOD	<LOD	0.087	0.085	<LOD	<LOD
MET 039	Baviacora- Rio Sonora	0.067	<LOD	<LOD	<LOD	0.113	0.113	<LOD	<LOD
MET 040	La Capilla- Rio Sonora	0.143	0.005	<LOD	<LOD	0.110	0.109	<LOD	<LOD
MET 041	El molinote- Rio Sonora	0.093	<LOD	<LOD	<LOD	0.135	0.108	<LOD	<LOD
MET 042	La Aurora- Rio Sonora	0.597	<LOD	<LOD	<LOD	0.101	0.098	<LOD	<LOD
MET 043	La Labor- Rio Sonora	0.285	<LOD	0.006	0.007	0.119	0.097	<LOD	<LOD
MET 044	Guadalupe de Ures- rio Sonora	1.327	<LOD	<LOD	<LOD	0.147	0.139	<LOD	<LOD
MET 045	San Rafael de Ures- R.5	0.243	0.004	0.004	0.005	0.151	0.156	<LOD	<LOD
MET 046	San Jose de Gracia	<LOD	<LOD	0.005	0.004	0.098	0.100	<LOD	<LOD
MET 047	San Jose de Gracia	2.751	<LOD	0.006	0.004	0.106	0.071	<LOD	<LOD
MET 051	El Molinito- Pozo	<LOD	<LOD	0.012	0.013	0.055	0.058	<LOD	<LOD
MET 053	El oregano- Rio sonora	0.120	<LOD	0.005	0.004	0.077	0.082	<LOD	<LOD
MET 054	El Gavilan- Rio Sonora	0.429	<LOD	0.005	0.006	0.097	0.092	<LOD	<LOD
MET 076	La Aurora- Pozo 1	0.145	<LOD	<LOD	<LOD	0.042	0.040	<LOD	<LOD
MET 078	La Labor- pozo	0.354	<LOD	0.005	0.005	0.079	0.077	<LOD	<LOD
MET 080	El Molinote- Pozo	<LOD	<LOD	0.004	0.006	0.090	0.094	<LOD	<LOD
MET 081	La Capilla- Pozo	0.034	<LOD	0.004	0.005	0.048	0.056	<LOD	<LOD
MET 083	Baviacora- Pozo 1	0.019	<LOD	0.006	0.007	0.073	0.074	<LOD	<LOD
MET 084	Baviacora- Pozo 2	0.008	<LOD	0.005	0.005	0.101	0.105	<LOD	<LOD
MET 085	Baviacora- Pozo 3	<LOD	<LOD	0.006	0.006	0.102	0.099	<LOD	<LOD
MET 088	San Pablo	<LOD	<LOD	<LOD	<LOD	0.095	0.094	<LOD	<LOD
MET 091	San Felipe -Rio	0.032	<LOD	<LOD	<LOD	0.088	0.088	<LOD	<LOD
MET 099	La Aurora- pozo 2	0.004	0.005	<LOD	<LOD	0.068	0.072	<LOD	<LOD
MET 110	Topahue- Pozo	<LOD	<LOD	<LOD	<LOD	0.087	0.086	<LOD	<LOD
MET 112	San Rafael de Ures	0.009	0.009	0.017	0.017	0.011	0.011	<LOD	<LOD
MET 113	Guadalupe de Ures	<LOD	<LOD	0.004	0.004	0.059	0.059	<LOD	<LOD
MET BAVI POZO 4	Baviacora- Pozo 4	0.010	0.005	<LOD	<LOD	0.004	0.004	<LOD	<LOD



Laboratorio Nacional de Geoquímica y Minerología
 Universidad Nacional Autónoma de México
 Geoquímica Ambiental



Muestra	sitio	Cr		Cu		Fe		Mn	
		mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
		totales	solubles	totales	solubles	totales	solubles	totales	solubles
MET 034	San Pedro de Ures	0.011	0.010	<LOD	<LOD	0.012	0.012	<LOD	<LOD
MET 036	Ures	<LOD	<LOD	0.092	0.011	0.055	0.026	0.002	0.001
MET 037	Ures Santiago	<LOD	<LOD	<LOD	<LOD	0.010	0.005	<LOD	<LOD
MET 039	Baviacora- Rio Sonora	<LOD	<LOD	<LOD	<LOD	0.038	0.005	0.017	0.010
MET 040	La Capilla- Rio Sonora	<LOD	<LOD	<LOD	<LOD	0.082	0.009	0.053	0.025
MET 041	El molinote- Rio Sonora	<LOD	<LOD	<LOD	<LOD	0.049	0.007	0.046	0.019
MET 042	La Aurora- Rio Sonora	0.008	<LOD	<LOD	<LOD	0.321	0.005	0.031	0.010
MET 043	La Labor- Rio Sonora	0.016	0.001	<LOD	<LOD	0.279	0.008	0.037	0.008
MET 044	Guadalupe de Ures- rio Sonora	0.013	0.001	<LOD	<LOD	0.911	0.009	0.299	0.266
MET 045	San Rafael de Ures- R.S	0.012	0.001	<LOD	<LOD	0.243	0.013	0.316	0.349
MET 046	San Jose de Gracia	<LOD	<LOD	<LOD	<LOD	0.066	0.073	0.001	0.001
MET 047	San Jose de Gracia	0.002	<LOD	0.010	<LOD	1.491	0.005	0.150	0.001
MET 051	El Molinito- Pozo	<LOD	<LOD	<LOD	<LOD	0.007	0.006	<LOD	<LOD
MET 053	El oregano- Rio sonora	<LOD	<LOD	<LOD	<LOD	0.070	0.006	0.021	0.004
MET 054	El Gavilan- Rio Sonora	<LOD	<LOD	<LOD	<LOD	0.275	0.010	0.103	0.001
MET 076	La Aurora- Pozo 1	0.013	0.001	<LOD	<LOD	0.198	0.009	0.014	0.010
MET 078	La Labor- pozo	0.026	0.001	<LOD	<LOD	0.443	0.009	0.322	0.314
MET 080	El Molinote- Pozo	0.001	0.001	<LOD	<LOD	0.007	0.007	<LOD	<LOD
MET 081	La Capilla- Pozo	0.003	0.001	<LOD	<LOD	0.026	0.009	0.000	<LOD
MET 083	Baviacora- Pozo 1	0.001	0.001	<LOD	0.011	0.030	0.009	0.007	0.006
MET 084	Baviacora- Pozo 2	0.001	0.001	<LOD	<LOD	0.015	0.010	0.002	0.002
MET 085	Baviacora- Pozo 3	0.001	0.001	<LOD	<LOD	0.010	0.009	0.000	<LOD
MET 088	San Pablo	<LOD	<LOD	<LOD	<LOD	0.008	0.008	<LOD	<LOD
MET 091	San Felipe -Rio	0.001	0.001	<LOD	<LOD	0.024	0.007	0.006	0.001
MET 099	La Aurora- pozo 2	<LOD	<LOD	0.011	<LOD	0.811	0.014	0.002	0.000
MET 110	Topahue- Pozo	<LOD	<LOD	<LOD	<LOD	0.017	0.017	0.001	0.001
MET 112	San Rafael de Ures	0.015	0.016	0.016	<LOD	0.013	0.015	0.001	0.000
MET 113	Guadalupe de Ures	<LOD	<LOD	<LOD	<LOD	0.007	0.008	<LOD	<LOD
MET BAVI POZO 4	Baviacora- Pozo 4	0.001	0.001	<LOD	<LOD	0.020	0.020	0.001	0.001



Laboratorio Nacional de Geoquímica y Minerología
Universidad Nacional Autónoma de México
Geoquímica Ambiental



Muestra	sitio	Ni		Pb		Sb		Zn	
		mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
		totales	solubles	totales	solubles	totales	solubles	totales	solubles
MET 034	San Pedro de Ures	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.012	0.010
MET 036	Ures	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.043	0.043
MET 037	Ures Santiago	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.009	0.009
MET 039	Baviacora- Rio Sonora	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.006	<LOD
MET 040	La Capilla- Rio Sonora	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.004	<LOD
MET 041	El molinote- Rio Sonora	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
MET 042	La Aurora- Rio Sonora	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.003	<LOD
MET 043	La Labor- Rio Sonora	0.006	0.005	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
MET 044	Guadalupe de Ures- rio Sonora	0.004	<LOD	<LOD	<LOD	<LOD	<LOD	0.006	<LOD
MET 045	San Rafael de Ures- R.S	0.004	0.001	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
MET 046	San Jose de Gracia	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.060	0.060
MET 047	San Jose de Gracia	0.002	<LOD	<LOD	<LOD	<LOD	<LOD	0.009	0.009
MET 051	El Molinito- Pozo	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.009	0.006
MET 053	El oregano- Rio sonora	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
MET 054	El Gavilan- Rio Sonora	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
MET 076	La Aurora- Pozo 1	0.006	0.005	<LOD	<LOD	<LOD	<LOD	0.010	0.012
MET 078	La Labor- pozo	0.010	0.005	<LOD	<LOD	<LOD	<LOD	0.022	0.006
MET 080	El Molinote- Pozo	0.002	0.002	<LOD	<LOD	<LOD	<LOD	0.014	0.014
MET 081	La Capilla- Pozo	0.003	0.003	<LOD	<LOD	<LOD	<LOD	0.003	0.003
MET 083	Baviacora- Pozo 1	0.003	0.004	<LOD	<LOD	<LOD	<LOD	0.030	0.007
MET 084	Baviacora- Pozo 2	0.003	0.004	<LOD	<LOD	<LOD	<LOD	0.005	0.005
MET 085	Baviacora- Pozo 3	0.003	0.004	<LOD	<LOD	<LOD	<LOD	0.011	0.013
MET 088	San Pablo	0.003	0.004	<LOD	<LOD	<LOD	<LOD	0.025	0.025
MET 091	San Felipe -Rio	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
MET 099	La Aurora- pozo 2	0.003	0.004	<LOD	<LOD	<LOD	<LOD	0.435	0.045
MET 110	Topahue- Pozo	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
MET 112	San Rafael de Ures	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.024	0.004
MET 113	Guadalupe de Ures	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.011	0.014
MET BAVI POZO 4	Baviacora- Pozo 4	0.003	0.003	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD



CONTROL DE CALIDAD

En el caso de los análisis determinados por ICP-OES la concentración de cada elemento fue determinada por triplicado, el valor reportado es el promedio de las tres determinaciones reportando una desviación estándar relativa (RSD) menor al 10%.

Para determinar la exactitud se utilizaron estándares de control analítico de concentraciones conocidas (5 y 50 ppm) los cuales fueron analizados como muestra para determinar su concentración por medio de curvas de calibración preparadas, indicando un buen desempeño del método de análisis.

% exactitud	Al	As	Ba	Cd	Cr	Cu	Fe	Mn	Ni	Pb	Sb	Zn
50 ppm	103.92	100.18	104.66	97.99	100.09	103.57	101.56	100.29	98.71	101.64	101.04	98.08
5 ppm	105.72	109.72	109.11	111.79	105.09	103.23	105.52	107.18	104.28	106.00	109.03	108.36

Para cromatografía se utilizaron estándares de concentraciones conocidas y se analizaron como muestras obteniendo las siguientes exactitudes.

% exactitud cationes	Na ⁺	K ⁺	Ca ²⁺	Mg ²⁺
15 ppm	100.3	100.4	100.8	100.7

% exactitud aniones	F-	Cl-	NO ₃ -	SO ₄ 2-
10 ppm	99.08	100.57	100.88	100.49
1 ppm	100.56	91.06	83.03	97.94

Sin mas por al momento quedo a sus ordenes.

Analista:

QFB. Fabiola Vega Garcia

QA Daniel Ramos Perez

M en C Alicia Santana Silva

responsable técnico: M en C Luis Gerardo Martinez Jardines



INFORME DE RESULTADOS

CERCANIA DE LA PRESA

Datos del solicitante:

Dr. Francisco Martín Romero correo electrónico: fmrch@geologia.unam.mx, fmrch@hotmail.com

Dirección: Instituto de Geología, UNAM. Teléfono: 56224386 ext 129

Información de las muestras

Fecha de recepción de muestras: 7 de julio del 2015

Información de los análisis

En las 15 muestras se determinaron elementos traza solubles y totales por Espectrometría de Emisión Óptica con Plasma Inductivamente Acoplado (ICP-OES) equipo Pekin Elmer serie 8300. Modo de inyección : **NEBULISADOR ULTRASONICO**

LD mg/L	Al	As	Ba	Cd	Cr	Cu	Fe	Mn	Ni	Pb	Sb	Zn
	0.08	0.07	0.01	0.02	0.003	0.122	0.01	0.007	0.01	0.03	0.1	0.007

El pH se determino con un potenciómetro Hanna Instruments, HI-98185 y se siguió el método estandarizado 9040 C de la US-EPA .

Conductividad eléctrica (GE) se determino con un conductímetro OAKTON Con 700. y se siguió el metodo APHA 1992. Standard methods for the examination of water and wastewater

Se determine cromatografía Ionica (CI) para elementos mayores en un cromatografo 883 Basic IC Plus marca Metrohm.

LD	F-	Cl-	NO3-	SO4 2-	Na ⁺	K ⁺	Ca ²⁺	Mg ²⁺
ppm	0.06	0.07	0.1	0.1	0.4	0.3	0.4	0.2

Lista de muestras:

ID Campo	coordenadas		ID Campo	coordenadas	
	X	Y		X	Y
Alfalfar Zanjón	511953	3245446	Rancho Vinorama	516285	3252408
Arroyo Zamorato	544927	3220231	Río San Miguel	519885	3253046
El Torreón	518352	3249082	Río Zanjón	511243	3239747
La Colmena	516621	3227526	Río Zanjón y San Miguel	511018	3221500
Las Pilas	523988	3229527	San Bartolo	520210	3224365
Mesa del Seri	515872	3213895	Santa Rosalía	551496	3221517
Pozo San Martín Topahue	535256	3237124	Zamorato	544841	3220193
Pueblo Nuevo (Piezómetro)	519247	3248662			



Laboratorio Nacional de Geoquímica y Mineralogía
Universidad Nacional Autónoma de México
Geoquímica Ambiental



Resultados de pH ,CE y Cl:

ID Campo	pH	CE	ID Campo	pH	CE
Alfalfar Zanjón	7.63	700	Rancho Vinorama	7.61	529
Arroyo Zamorato	7.6	247	Río San Miguel	7.75	437
El Torreón	7.24	699	Río Zanjón	7.91	131.3
La Colmena	7.05	2090	Río Zanjón y San Miguel	7.7	222
Las Pilas	7.19	626	San Bartolo	7.06	836
Mesa del Seri	7.94	495	Santa Rosalía	7.01	742
Pozo San Martín Topahue	7.17	999	Zamorato	7.2	470
Pueblo Nuevo (Piezómetro)	7.53	638			

ID Campo	Na	K	Ca ²⁺	Mg ²⁺	F ⁻	Cl ⁻	NO ₃ ⁻	SO ₄ ²⁻	HCO ₃ ⁻
LD	0.4	0.3	0.4	0.2	0.06	0.07	0.1	0.04	0.1
Unidades	mg/l				mg/l				
Alfalfar Zanjón	82.94	2.69	53.83	9.19	0.45	75.49	16.76	56.01	350
Arroyo Zamorato	11.15	5.38	34.48	3.02	0.20	2.17	2.40	4.47	152
El Torreón	45.37	3.70	81.42	12.03	0.37	27.17	38.77	88.56	327
La Colmena	3.39	0.15	5.04	0.86	0.01	4.40	0.99	10.48	19
Las Pilas	69.75	3.89	50.86	11.51	0.60	19.91	2.80	64.69	274
Mesa del Seri	79.83	3.32	8.52	5.03	1.00	29.18	13.12	40.82	269
Pozo San Martín Topahue	90.07	5.05	105.39	20.04	0.53	44.08	0.00	392.03	263
Pueblo Nuevo (Piezómetro)	61.72	3.43	59.21	6.43	0.46	35.83	4.02	133.67	153
Rancho Vinorama	86.60	2.47	19.49	1.41	1.53	66.41	3.92	25.75	508
Río San Miguel	23.83	6.15	48.63	8.29	0.22	16.69	20.31	55.02	316
Río Zanjón	1.76	1.57	7.11	1.17	0.14	6.88	11.50	7.10	203
Río Zanjón y San Miguel	12.29	5.74	30.68	5.80	0.15	11.26	14.89	19.05	215
San Bartolo	62.99	3.27	75.47	13.67	0.46	36.77	9.67	115.00	197
Santa Rosalía	36.17	1.46	51.49	11.82	0.46	18.91	20.05	45.00	191
Zamorato	14.10	3.51	44.16	3.57	0.23	7.22	0.00	5.67	180

<LD= bajo el limite de detección



Laboratorio Nacional de Geoquímica y Mineralogía
Universidad Nacional Autónoma de México
Geoquímica Ambiental



ID Campo	Al		As		Ba		Cd	
	mg/l	RSD (%)	mg/l	RSD (%)	mg/l	RSD (%)	mg/l	RSD (%)
LD	0.0044		0.0055		0.0023		0.0007	
Alfalfar Zanjón totales	0.0113	0.81	0.0114	13.00	0.1347	1.22	<LD	5.14
Alfalfar Zanjón solubles	<LD	31.53	0.0115	3.85	0.1405	0.25	<LD	12.85
Arroyo Zamorato totales	0.0344	0.13	0.0089	4.60	0.1207	2.29	<LD	26.53
Arroyo Zamorato solubles	0.0185	0.74	0.0089	16.15	0.1207	0.04	<LD	15.82
El Torreón totales	<LD	13.82	0.0095	15.86	0.0991	0.91	<LD	6.74
El Torreón solubles	<LD	2.47	0.0094	5.89	0.1009	0.45	<LD	5.05
La Colmena totales	0.1209	2.48	<LD	36.02	0.0529	0.77	<LD	10.03
La Colmena solubles	0.0203	4.10	<LD	5.34	0.0529	0.35	<LD	15.21
Las Pilas totales	<LD	9.76	0.0100	6.73	0.0677	0.57	<LD	5.59
Las Pilas solubles	<LD	2.58	0.0101	11.78	0.0636	0.56	<LD	8.03
Mesa del Seri totales	0.0076	4.67	0.0143	6.19	0.0165	1.91	<LD	6.67
Mesa del Seri solubles	0.0068	5.39	0.0152	7.19	0.0156	1.94	<LD	12.88
Pozo San Martín Topahue totales	0.0103	2.51	<LD	67.43	0.0777	0.96	<LD	3.25
Pozo San Martín Topahue solubles	0.0103	1.29	<LD	31.26	0.0724	1.39	<LD	19.38
Pueblo Nuevo (Piezómetro) totales	0.0373	1.25	<LD	32.28	0.0895	0.60	<LD	6.57
Pueblo Nuevo (Piezómetro) solubles	<LD	18.55	<LD	6.70	0.0856	0.52	<LD	8.90
Rancho Vinorama totales	0.0752	0.49	0.0117	6.58	0.0585	0.18	<LD	4.13
Rancho Vinorama solubles	0.0752	2.49	0.0116	5.88	0.0612	0.37	<LD	5.23
Río San Miguel totales	18.9432	2.05	0.0157	7.10	0.2734	0.91	<LD	1.30
Río San Miguel solubles	0.0085	3.18	<LD	34.41	0.0817	0.23	<LD	14.99
Río Zanjón totales	173.8685	0.39	0.0520	1.40	2.3308	1.18	0.0433	1.50
Río Zanjón solubles	0.0143	0.74	0.0039	47.96	0.0870	2.20	<LD	4.48
Río Zanjón y San Miguel totales	259.7627	1.11	0.0720	0.62	3.3460	1.32	0.0618	0.86
Río Zanjón y San Miguel solubles	1.3131	0.71	0.0054	19.18	0.1100	0.36	<LD	10.54



Laboratorio Nacional de Geoquímica y Mineralogía
Universidad Nacional Autónoma de México
Geoquímica Ambiental



ID Campo	Al		As		Ba		Cd	
	mg/l	RSD (%)	mg/l	RSD (%)	mg/l	RSD (%)	mg/l	RSD (%)
LD	0.0044		0.0055		0.0023		0.0007	
San Bartolo totales	0.0112	5.53	0.0082	17.33	0.1139	0.92	<LD	5.56
San Bartolo solubles	0.0047	1.27	0.0085	4.49	0.1101	0.96	<LD	10.88
Santa Rosalía totales	<LD	16.53	0.0116	4.74	0.2054	0.63	<LD	8.68
Santa Rosalía solubles	<LD	215.68	0.0098	7.49	0.2088	1.47	<LD	5.53
Zamorato totales	0.0150	1.45	0.0087	18.55	0.1364	0.62	<LD	4.07
Zamorato solubles	0.0076	3.23	0.0076	29.05	0.1391	1.81	<LD	10.37

ID Campo	Cr		Cu		Fe		Mn	
	mg/l	RSD (%)	mg/l	RSD (%)	mg/l	RSD (%)	mg/l	RSD (%)
LD	0.0007		0.0060		0.00165		0.00154	
Alfalfar Zanjón totales	<LD	3.30	<LD	2.12	0.0108	1.25	<LD	2.33
Alfalfar Zanjón solubles	<LD	0.70	<LD	1.78	0.0108	2.02	<LD	0.53
Arroyo Zamorato totales	<LD	15.04	<LD	1.22	0.0196	0.28	<LD	0.63
Arroyo Zamorato solubles	<LD	9.56	<LD	0.86	0.0145	0.81	<LD	0.59
El Torreón totales	<LD	8.42	<LD	1.65	<LD	2.77	<LD	1.97
El Torreón solubles	<LD	14.47	<LD	2.38	<LD	0.25	<LD	1.10
La Colmena totales	<LD	4.19	<LD	1.08	0.2079	1.02	0.0039	1.41
La Colmena solubles	<LD	12.57	<LD	2.89	0.0065	1.94	0.0040	0.70
Las Pilas totales	<LD	7.48	<LD	1.74	0.0063	0.38	<LD	1.79
Las Pilas solubles	<LD	11.41	<LD	1.99	0.0042	1.32	<LD	0.67
Mesa del Seri totales	0.0083	1.76	<LD	4.03	<LD	1.29	<LD	1.20
Mesa del Seri solubles	0.0079	0.38	<LD	6.80	<LD	0.45	<LD	1.02
Pozo San Martín Topahue totales	<LD	3.09	<LD	6.94	0.1130	2.04	0.0162	1.83
Pozo San Martín Topahue solubles	<LD	5.52	<LD	0.84	0.0148	0.78	0.0104	0.50
Pueblo Nuevo (Piezómetro) totales	<LD	3.65	0.0118	0.56	0.1914	0.35	0.0161	0.24
Pueblo Nuevo (Piezómetro) solubles	<LD	1.38	<LD	1.04	0.0120	1.77	0.0041	2.06
Rancho Vinorama totales	<LD	0.38	0.0518	0.33	0.2432	0.27	0.0079	0.13
Rancho Vinorama solubles	<LD	1.78	0.0132	2.91	0.2432	2.09	0.0027	1.66



Laboratorio Nacional de Geoquímica y Mineralogía
Universidad Nacional Autónoma de México
Geoquímica Ambiental



ID Campo	Cr		Cu		Fe		Mn	
	mg/l	RSD (%)	mg/l	RSD (%)	mg/l	RSD (%)	mg/l	RSD (%)
LD	0.0007		0.0060		0.00165		0.00154	
Río San Miguel totales	0.0063	1.27	0.0280	2.83	17.3656	2.63	0.5940	1.30
Río San Miguel solubles	<LD	6.53	0.0269	2.92	<LD	1.52	<LD	0.66
Río Zanjón totales	0.0876	0.80	0.2721	1.44	59.9627	0.51	5.2806	0.55
Río Zanjón solubles	<LD	4.00	0.0324	0.92	0.0228	2.32	<LD	0.70
Río Zanjón y San Miguel totales	0.1289	1.20	0.4348	0.37	316.845	1.34	15.3642	0.68
Río Zanjón y San Miguel solubles	<LD	3.41	0.0333	0.08	0.9540	0.66	0.0273	1.17
San Bartolo totales	<LD	6.94	<LD	1.56	0.0117	2.29	<LD	1.16
San Bartolo solubles	<LD	0.60	<LD	1.33	0.0117	0.62	<LD	0.59
Santa Rosalía totales	<LD	7.13	0.0131	2.56	<LD	3.60	<LD	5.54
Santa Rosalía solubles	<LD	1.76	<LD	1.46	<LD	2.94	<LD	1.55
Zamorato totales	<LD	5.65	<LD	2.23	0.0582	1.58	0.0383	1.70
Zamorato solubles	<LD	11.46	<LD	2.31	0.0104	1.03	0.0383	1.29

<LD= bajo el límite de detección

ID Campo	Ni		Pb		Sb		Zn	
	mg/l	RSD (%)	mg/l	RSD (%)	mg/l	RSD (%)	mg/l	RSD (%)
LD	0.00076		0.00177		0.00056		0.00568	
Alfalfar Zanjón totales	<LD	15.52	<LD	12.97	<LD	203.05	0.0040	1.78
Alfalfar Zanjón solubles	<LD	2.82	<LD	28.82	<LD	63.58	0.0040	0.92
Arroyo Zamorato totales	<LD	3.96	<LD	10.97	<LD	15.81	<LD	0.73
Arroyo Zamorato solubles	<LD	5.71	<LD	17.67	<LD	163.96	<LD	1.13
El Torreón totales	<LD	8.86	<LD	29.98	<LD	1165.95	<LD	1.84
El Torreón solubles	<LD	4.05	<LD	30.17	<LD	1267.45	<LD	1.07
La Colmena totales	<LD	5.51	<LD	23.93	<LD	110.73	0.1468	1.19
La Colmena solubles	<LD	3.25	<LD	59.31	<LD	472.51	0.1428	1.87
Las Pilas totales	<LD	7.13	<LD	3.96	<LD	321.57	<LD	1.80
Las Pilas solubles	<LD	6.37	<LD	17.21	<LD	85.17	<LD	1.09



Laboratorio Nacional de Geoquímica y Mineralogía
Universidad Nacional Autónoma de México
Geoquímica Ambiental



ID Campo	Ni		Pb		Sb		Zn	
	mg/l	RSD (%)	mg/l	RSD (%)	mg/l	RSD (%)	mg/l	RSD (%)
LD	0.00076		0.00177		0.00056		0.00568	
Mesa del Seri totales	<LD	5.29	<LD	21.71	<LD	343.62	<LD	1.88
Mesa del Seri solubles	<LD	2.32	<LD	37.29	<LD	69.54	<LD	1.57
Pozo San Martín Topahue totales	<LD	13.77	<LD	10.75	<LD	47.78	<LD	1.49
Pozo San Martín Topahue solubles	<LD	11.04	<LD	55.60	<LD	44.09	<LD	0.48
Pueblo Nuevo (Piezómetro) totales	<LD	1.99	<LD	13.45	<LD	16.15	0.0179	1.98
Pueblo Nuevo (Piezómetro) solubles	<LD	8.06	<LD	4.19	<LD	137.67	<LD	0.32
Rancho Vinorama totales	<LD	2.84	<LD	145.52	<LD	357.60	0.0570	0.79
Rancho Vinorama solubles	<LD	3.34	<LD	18.80	<LD	128.21	0.0214	2.23
Río San Miguel totales	0.0068	1.37	0.0211	1.92	<LD	23.20	0.1095	1.65
Río San Miguel solubles	<LD	3.67	<LD	58.69	<LD	186.17	0.0252	2.96
Río Zanjón totales	0.0855	0.74	0.1929	0.67	<LD	149.41	0.6913	0.65
Río Zanjón solubles	<LD	3.32	<LD	293.44	<LD	138.38	0.0068	0.17
Río Zanjón y San Miguel totales	0.1157	1.03	0.2663	0.23	<LD	21.75	0.9167	1.08
Río Zanjón y San Miguel solubles	<LD	2.55	<LD	15.60	<LD	97.08	0.0154	1.17
San Bartolo totales	<LD	4.10	<LD	15.90	<LD	92.10	0.0335	1.68
San Bartolo solubles	<LD	1.67	<LD	21.57	<LD	61.58	0.0348	0.87
Santa Rosalía totales	<LD	4.85	<LD	51.34	<LD	155.50	0.0283	2.50
Santa Rosalía solubles	<LD	6.80	<LD	24.51	<LD	330.79	0.0094	0.62
Zamorato totales	<LD	6.00	<LD	62.00	<LD	210.97	0.0347	1.62
Zamorato solubles	<LD	3.82	<LD	52.36	<LD	115.26	0.0323	1.63



CONTROL DE CALIDAD

En el caso de los análisis determinados por ICP-OES la concentración de cada elemento fue determinada por triplicado, el valor reportado es el promedio de las tres determinaciones reportando también la desviación estándar relativa (RSD) de las mediciones.

Para determinar la exactitud en cromatografía e ICP-OES se utilizaron estándares de control analítico de concentraciones conocidas (5 ppm para cromatografía y de 5 ppb y 10 pm para ICP-OES) los cuales fueron analizados como muestra para determinar su concentración por medio de curvas de calibración preparadas, las concentraciones se encontraron entre el 81 y el 120% lo cual indica un buen desempeño del método de análisis.

% exactitud	Al	As	Ba	Cd	Cr	Cu	Fe	Mn	Ni	Pb	Sb	Zn
50 ppm	104.53	99.20	103.23	98.16	100.53	103.22	101.55	101.08	99.88	99.89	98.52	97.39
5 ppm	98.59	96.91	106.21	109.68	106.30	98.50	107.83	105.81	105.39	103.84	99.70	108.07

CROMATOGRAFIA:

	Na ⁺	K ⁺	Ca ²⁺	Mg ²⁺
% exactitud	99.7	100.00	99.97	99.85

	F ⁻	Cl ⁻	NO ₃ ⁻	SO ₄ ²⁻
% exactitud	99.91	99.85	99.88	99.55

Sin más por al momento quedando a sus órdenes.

Analizó:

Supervisó:

QFB. Fabiola Vega García

Men C Alicia Santana Silva

M en C Luis Gerardo Martínez

APÉNDICE DE LABORATORIO 4

Resultados de las concentraciones
totales de metales por
Espectrometría de Emisión Óptica
con Plasma Inductivamente Acoplado
(ICP-OES) en las muestras de
material impacto y colectado, durante
la remediación y depositado en los
caminos de acceso de la presa de
jales de la empresa



INFORME DE RESULTADOS
SEDIMENTOS DE RIO SONORA EN PRESA DE JALES (BALANCE)
CANANEA, SONORA
29 abril 2015

Información de las muestras

Se analizaron 30 muestras de zonas de montones de sedimentos del río Sonora, en presa de Jales, en Cananea, Sonora.

Las muestras se recibieron en bolsas de plástico de 25X10 cm, etiquetadas como zona 1, 2 y 3 y cada una de estas con 10 muestras (m1 a m10) así como un listado de coordenadas y observaciones adjunto.

Información de los análisis

En las 81 muestras se determinaron elementos traza por Espectrometría de Emisión Óptica con Plasma Inductivamente Acoplado (ICP-OES) en un equipo Pekín Elmer serie 8300

Las muestras fueron digeridas por el método EPA 3051, los resultados se reportan en mg/kg.

modo de inyección : Cámara ciclónica.

Limites de detección :

Los límites considerados son para modo de inyección cámara ciclónica y están reportados en mg/l.

LD mg/L	Al	As	Ba	Cd	Cr	Cu	Fe	Mn	Ni	Pb	Sb	Zn
	0.08	0.07	0.01	0.02	0.003	0.122	0.01	0.007	0.01	0.03	0.1	0.007

<LOD= Bajo el límite de detección



Listado de recepción de muestras

	ESTE	NORTE
ZONA 1 (10 muestras)	571,406	3,424,498
ZONA 2 (10muestras)	571,436	3,424,557
ZONA 3 (10 muestras)	571,557	3,423,720

RESULTADOS DE ICP

Sample ID	Al	As	Ba	Cd	Cr	Cu
	mg/kg					
ZONA 1-M1	19557.141	27.293	240.331	5.568	48.250	516.350
ZONA 1-M2	13979.401	21.908	197.360	5.078	45.017	403.514
ZONA 1-M3	27351.962	64.554	289.017	8.737	18.615	1031.947
ZONA 1-M4	20835.940	29.589	259.628	4.909	27.820	469.763
ZONA 1-M5	23404.486	36.510	268.708	8.547	22.167	837.224
ZONA 1-M6	16198.224	19.005	214.475	4.779	43.039	267.884
ZONA 1-M7	20314.556	30.359	255.765	5.578	32.675	439.145
ZONA 1-M8	19340.601	32.324	246.833	4.730	30.768	303.903
ZONA 1-M9	25329.768	20.954	335.801	5.370	25.307	955.648
ZONA 1-M10	24342.328	31.096	285.694	4.867	25.043	354.838
ZONA 2-M1	35355.455	47.474	381.062	5.574	22.337	356.895
ZONA 2-M2	27041.325	13.200	280.815	5.079	53.373	189.882
ZONA 2-M3	22914.586	31.465	309.860	4.091	15.448	281.308
ZONA 2-M4	24722.942	21.870	285.974	4.180	31.064	232.132
ZONA 2-M5	35194.365	30.428	330.845	4.974	42.748	273.167
ZONA 2-M6	34690.835	12.102	107.823	4.918	57.139	299.573
ZONA 2-M7	18642.305	19.230	193.436	5.612	50.665	266.509
ZONA 2-M8	27389.775	28.792	284.611	6.024	73.853	307.656



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Geoquímica Ambiental



	Fe	Mn	Ni	Pb	Sr	Zn
	mg/Kg					
ZONA 1-M1	37612.394	1051.914	23.452	82.446	63.106	175.295
ZONA 1-M2	35230.941	838.147	21.311	67.334	54.398	142.800
ZONA 1-M3	35006.052	1691.346	34.733	64.422	52.988	559.896
ZONA 1-M4	32783.414	644.333	19.878	44.249	129.200	157.439
ZONA 1-M5	31778.840	2023.017	33.953	55.327	52.547	522.736
ZONA 1-M6	32954.798	903.138	22.122	71.917	67.633	144.252
ZONA 1-M7	37103.607	574.664	20.610	39.944	110.782	151.247
ZONA 1-M8	33223.297	682.475	20.046	40.686	136.443	123.697
ZONA 1-M9	31402.833	651.699	21.040	40.611	93.955	247.252
ZONA 1-M10	33577.790	614.214	19.298	35.709	152.792	138.223
ZONA 2-M1	34995.454	688.679	20.352	44.043	219.285	152.817
ZONA 2-M2	34596.024	687.838	21.072	37.992	213.478	120.054
ZONA 2-M3	27918.048	683.223	17.104	40.475	202.936	132.728
ZONA 2-M4	29930.856	642.324	19.262	44.103	212.655	121.381
ZONA 2-M5	34072.524	758.407	27.124	43.297	200.418	164.954
ZONA 2-M6	35616.823	574.679	34.529	47.352	38.284	147.978
ZONA 2-M7	39455.912	770.630	21.176	63.378	59.322	136.813
ZONA 2-M8	40437.583	843.843	28.806	60.788	148.332	158.376

Sample ID	Al	As	Ba	Cd	Cr	Cu
	mg/kg					
ZONA 2-M9	31634.582	46.284	339.492	5.616	39.715	452.094
ZONA 2-M10	47416.431	76.610	457.643	6.323	21.376	572.062
ZONA 3-M1	51011.945	92.648	494.881	7.379	22.911	698.540
ZONA 3-M2	43501.502	74.950	453.216	6.442	25.074	550.234
ZONA 3-M3	42282.775	54.241	413.403	5.640	21.042	409.077
ZONA 3-M4	41318.093	69.426	429.850	6.325	20.272	550.821
ZONA 3-M5	35411.304	49.125	364.866	5.774	32.584	402.512
ZONA 3-M6	26714.709	33.949	310.487	5.177	37.429	299.732
ZONA 3-M7	20857.054	58.219	298.989	5.619	25.347	389.117
ZONA 3-M8	25408.110	27.420	281.276	4.711	26.150	278.130
ZONA 3-M9	18019.881	24.913	250.879	4.941	49.844	223.921
ZONA 3-M10	23793.597	44.769	275.103	5.966	33.846	399.918



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Sample ID	Fe	Mn	Ni	Pb	Sr	Zn
	mg/Kg					
ZONA 2-M9	37313.139	777.848	22.051	52.797	161.151	169.194
ZONA 2-M10	40208.734	838.835	22.649	54.682	196.183	200.046
ZONA 3-M1	42726.207	773.061	24.847	59.680	197.823	243.245
ZONA 3-M2	40670.757	800.147	24.707	54.546	196.405	187.087
ZONA 3-M3	35331.107	752.046	22.115	45.893	225.195	180.009
ZONA 3-M4	38668.441	740.133	21.663	53.429	198.945	186.990
ZONA 3-M5	37470.581	838.672	22.494	56.073	163.760	180.281
ZONA 3-M6	34792.703	750.616	21.194	51.378	140.296	151.756
ZONA 3-M7	37721.013	621.764	18.476	44.738	74.991	145.820
ZONA 3-M8	32065.283	648.754	18.455	39.185	100.640	135.400
ZONA 3-M9	35031.955	951.169	24.335	71.491	65.882	140.969
ZONA 3-M10	39229.133	614.119	21.421	45.749	133.391	153.181

CONTROL DE CALIDAD

En el caso de los análisis determinados por ICP-OES la concentración de cada elemento fue determinada por triplicado, el valor reportado es el promedio de las tres determinaciones, la desviación estándar relativa (RSD) de las mediciones fue menor al 10%.

Para determinar la exactitud se utilizaron estándares de control analítico de concentraciones conocidas (5 y 50 ppm) los cuales fueron analizados como muestra para determinar su concentración por medio de curvas de calibración preparadas, indicando un buen desempeño del método de análisis.

% exactitud	Al	As	Ba	Cd	Cr	Cu	Fe	Mn	Ni	Pb	Sb	Zn
50 ppm	104.27	92.95	104.66	98.20	100.59	103.55	101.90	101.00	100.03	100.34	97.60	96.61
10 ppm	95.98	99.55	105.46	108.01	103.26	99.49	106.39	111.85	109.28	100.66	100.37	105.06

Sin mas por al momento quedo a sus ordenes.

Analista:


QFB. Fabiola Vega García


M en C Alicia Santana Silva


Responsable técnico: M en C Luis Gerardo Martínez Jardines